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AFTER-THOUGHTS RELATING TO THE ST. LOUIS MEETING OF THE WESTERN GAS ASSOCIATION.

NUMBER II.

The remarks of Mr. Thomas, made in connection with the discussion on the papers of Messrs. Somerville and Hyde, were interesting, and went to show that the Eastern practice appears to have a tendency towards keeping somewhat in advance of Western usage. Boards, in the opinion of the writer, are much more efficient as a scrubbing material than brush—they are more easily adjusted; less liable to be clogged; distribute water and gas with uniformity; present a rougher scrubbing surface; do not pack down with weight of accumulated tar; and certainly less trouble is experienced in their removal, when such action is rendered necessary through the happening of obstructions. However, I know that many Western gas engineers have used the board scrubbers, constructed after the manner described by Mr. Thomas, both as tar extractors, placed immediately after the hydraulic main, and as ammonia scrubbers.

Mr. Thomas calls attention to one thing that should not be lost sight of; and it is also a fact that goes largely to portray the inferiority of the tower scrubber when placed in comparison with the "Standard" vessel. The statement referred to is that the tower scrubber, in order to do efficient work, must be run to its maximum calculated capacity. This proposition should not be questioned—certainly not as to quantity of water that should pass through scrubber. With the "Standard" the gas will all be brought in contact with water of some degree of purity just as effectually when the quantity of water entering the scrubber is but one gallon per 1,000 cubic feet of gas as when the quantity of water equals 10 gallons per thousand.

Very serious and troublesome stoppages often occur in and and about gas works which are solely to be attributed to the use of limey water similar to the quality of that described by Mr. Slater and Mr. Lansden, and the employment of which caused the above-named gentlemen to experience bother in the working of their "Standard" scrubbers; but, then, these troubles are not peculiar to the "Standard." I have heard of 18-inch sewers, or drains, leading off from gas works being entirely filled up with a deposit of lime and the tarry substances that are carried down with it.

Mr. Burns's paper on "Gas Fitting," while it cannot be said as presenting either new facts or calling attention to any startling discoveries, treats in a pleasing manner one of the subjects with which gas men have to do every day; and, I am sorry to add, it appears from this very familiarity they are prone to give its consideration less time and thought than its importance deserves. The paper could be occasionally read over and studied with resulting profit by most gas managers. Just how the use of a steam gauge can prevent the practice of the fraud spoken of by Mr. Burns, to any greater degree than use of a mercury gauge would, does not seem quite clear. If the air which leaks out of the tubing during the test can be compensated for, and the pressure maintained by expanding the remaining air in the tube through heating the pipe with a torch, I fail to see why the fraud could not be as successfully practiced under the one arrangement as the other—that is, when either a mercury gauge or a steam gauge was used.

I quote the following sentence from that portion of Mr. Smedberg's paper (as published in the JOURNAL) in which he explains the theory of the suspension of watery vapor or liquid molecules: "The various modes of overcoming this repulsion—of *aggravating* the molecules, of reliquefying the vapor—are cooling, chemical affinity, compression, and finally, percussion."

There is evidently an aggravating error hereabouts, more than likely to be charged up to the waywardness of the compositor, which will cause Mr. Smedberg to aggregate numerous expletives not to be found in the catechism.

Mr. Smedberg's paper is as full of good things as his scrubber is of small holes. He claims almost miraculous work for his machine; but he makes these claimes in such a way as to leave no room for a "doubting Thomas." As a tar extractor, in my opinion, the Pelouze and Audouin is superior to all others, and for this one (if for no other) reason—it is automatic, adjusting its capacity to the quantity of gas made. And right here it would seem as though the remarks made by Mr. Thomas, when contrasting the "tower" with the "Standard" scrubber, would apply with equal force in making a comparison of this with the scrubbers in use in most gas works.

Mr. Jas. G. Miller's paper, on "Wooden Pipes for Gas Mains," elicited a warm discussion; and a perusal of the same reveals the case that the verdict generally agreed upon was in condemnation of their employment. It must be confessed, however, that wooden gas mains appear to have been successful at Green Bay, Wisconsin. The value of Mr. Miller's paper would have been very materially enhanced had he presented therewith some figures in support of the bare statements enunciated. It may well be considered as an open question whether wooden mains have ever been properly "treated" with preservatives before being placed beneath the earth surface, and expected to do duty as gas conduits. It ought not be expected that an outside coating of tar or pitch should close all pores; even if the single coating did temporarily seal them, the first rapid change in weather temperature would speedily accomplish the work of unsealing; and, further, the operation of surface coating in no way diminishes the tendency of natural elemental decay.

Some railroads in European countries are said to have now in active and serviceable use cross ties that were laid 25 years ago. They have been subjected to much rougher usage, and exposed to vastly more severe climatic conditions, than any that wooden gas mains ever encountered. In fact so great has been the advancement in this direction that many railroads, in all parts of the world, are putting down ties that have been subjected to antiseptic courses of treatment. I might here remark, by way of contrast, to the practice pursued in preparing wooden gas mains, that all moisture and sap is first extracted from the pores of the ties, and the va, or or creosote is, under pressure, then injected throughout the entire woody fibre. It is not unlikely that, if a similarly intelligent course were followed out in the preparation of wooden gas mains, these conduits might be given a lifetime of half a century. It must not, however, be lost sight of that the question of economy would needs be considered, except possibly in the portions of the country where timber is abundant and cheap. "Delta."

Electric Lighting on Shipboard.

The employment of electric lighting methods on ocean steamers gains ground steadily. *Engineering* notes that the new steamship Mexico has a very complete electric light installation consisting of 220 Swan glow lamps, each of 20-candle power. There are two lamp circuits. One of them, known as the day circuit, consists of about 160 lights, and the remaining lights constitute the night circuit. In the main saloon there are 46 separate lamps, designed for use either with candles or electricity; in all other parts of the ship the lamps are exclusively electric. Eighteen of the saloon lamps are double, making 36 in all. They are provided with two-way switches, so that at will either one or both of the lights may be switched on or off. On the deck there are four cluster lamps, each of five lights; two being placed over the hatchways, the other two being intended for lighting the promenade. The current is supplied by two "Victoria" dynamos, so arranged that either of them may be used for one of the circuits, and it is possible to put both circuits, or portions of them, on one dynamo. The day-circuit machine is driven by an engine of 25 to 30 horse power, and the night circuit by one of from 10 to 12 horse power. A speed of about 500 revolutions is used on the larger circuit, the night circuit being worked at about 25 per cent. greater speed.

Non-Freezing Wet Meters.

The *Scientific American* notes that chloride of magnesium is a bye-product of salt working, found in deposits lying above the true rock salt. Three parts of this material are dissolved in five parts of warm water, and diluted to 22–23° Beaume, to make the solution for filling meters. The salt costs, in Dessau, 10 marks per 100 kilos. In 1879 a number of new and old meters at a small station were charged with this mixture; and the result has been so favorable that its use has since been extended. The solution is used in the first filling of consumers' meters, precisely the same as water, and the corrections for level are made with water in the ordinary way at the following visits of the inspectors. After two or three adjustments, however, the water line is found to maintain remarkable constancy, as the solution does not evaporate. In consequence of this feature, there are fewer deposits of water in consumers' pipes.

The greatest advantage on the side of the chloride of magnesium, however, is its power of resisting frost. In Central Europe this is a most important consideration; and when, as in this case, a non-freezing solution is also non-corrosive and non-volatile in hot weather, the argument on behalf of adopting it is conclusive. It might have been thought that the use of this solution instead of water would be an additional expense. But, as already stated, the contrary is the fact; for taking into account the prevention of damage to the meters from frost, the diminished charge for inspection and watering (due to the constancy of the water line), and saving in special cold weather inspection, there is a considerable economy from the use of chloride of magnesium apart from the great advantage of preventing complaints from consumers during severe frosts.

[A Paper read before the Society of Gas Lighting.]

Figures Worth Studying.

By William Farmer.

I have prepared the following table, which contains some of the elements and compounds, with their combining weights, volumes, and specific gravities.

When the combining weight of any of these elements and compounds is taken in pounds, then the gas or vapor therefrom will always occupy about 377.07 cubic feet of space, at 60° F. and 30 inches barometer.

If we divide this constant, 377.07, by the combining weight of any of the substances, then the quotient will be the number of cubic feet per pound of the same.

If we divide the combining weight of any of the substances given in the table by 2, then the quotient will give the density of the same, as compared with hydrogen.

If we divide the combining weight of any of the substances by the constant 28.87, then the quotient will be the specific gravity of the gas or vapor therefrom, as compared with air.

All the calculations are based on the atomic weights, which are now generally adopted by the majority of chemists.

	Combining Weight.	Cubic Feet per Pound.	Cubic Feet per Combining Weight.	Specific Gravity, Air = 1.
Hydrogen (H_2)	2.00	188.53	377.07	0.0692
Carbon vapor (C_2)	23.94	15.75	377.07	0.8292
Nitrogen (N_2)	28.06	13.43	377.07	0.9719
Oxygen (O_2)	31.92	11.81	377.07	1.1056
Chlorine (Cl_2)	71.00	5.31	377.07	2.4593
Bromine (Br_2)	160.00	2.35	377.07	5.5420
Flourine (F_2)	38.00	9.92	347.07	1.3162
Iodine (I_2)	253.20	1.48	377.07	8.7703
Sulphur (S_2)	63.96	5.89	377.07	2.2154
Phosphorus (P_4)	123.84	3.04	377.07	4.2895
Carbonic oxide (CO)	27.93	13.50	377.07	0.9674
Carbonic acid (CO_2)	43.89	8.59	377.07	1.5202
Water vapor (H_2O)	17.96	20 99	377.07	0.6221
Hydro. sulphide (H_2S)	33.98	11.09	377.07	1.1770
Ammonia (H_3N)	17.03	22.14	377.07	0.5898
Sulphurous oxide (SO_2)	63.90	5.90	377.07	2.2133
Sulphuric oxide (SO_3)	79.86	4.72	377.07	2.7662
Cyanogen (C_2N_2)	52.00	7.25	377.07	1.8011
Bisulphide of carbon (CS_2)	75.93	4.96	377.07	2.6300
Ethyl alcohol (C_2H_6O)	45.90	8.21	377.07	1.5898
Ethyl ether ($C_4H_{10}O$)	73.84	5.10	377.07	2.5576
Methyl alcohol (CH_4O)	31.93	11.81	377.07	1.1059
Methyl chloride (CH_3Cl)	50.47	7.47	377.07	1.7482
Carbonyl chloride ($COCl_2$)	98.93	3.81	377.07	3.4267
Phosphine gas (PH_3)	33.96	11.10	377.07	1.1763
Hydrochloric acid (HCl)	36.50	10.33	377.07	1.2642
Methane (CH_4)	15.98	26.61	377.07	0.5531
Ethane (C_2H_6)	29.94	12.59	377.07	1.0370
Propane (C_3H_8)	43.91	8.58	377.07	1.5209
Butane (C_4H_{10})	57.88	6.51	377.07	2.0048
Ethene (C_2H_4)	27.94	13.49	377.07	0.9677
Propene (C_3H_6)	41.91	8.99	377.07	1.4516
Butene (C_4H_8)	55.88	6.74	377.07	1.9355
Ethine (C_2H_2)	25.94	14.53	377.07	0.8985
Propine (C_3H_4)	39.91	9.44	377.07	1.3824
Butine (C_4H_6)	53.88	6.99	377.07	1.8662
Quintone (C_5H_8)	65.85	5.72	377.07	2.2809
Benzene (C_6H_6)	77.82	4.84	377.07	2.6955
Styrolene (C_8H_8)	103.75	3.63	377.07	3.5936
Naphthalene ($C_{10}H_8$)	127.70	2.95	377.07	4.4232
Turpentine ($C_{10}H_{16}$)	135.70	2.77	377.07	4.7003
Dry Air	28.87	13.06	.....	1.0000

[Official Report.—Continued from page 8.]

Seventh Annual Meeting of the Western Gas Association.

Held at the Southern Hotel, St. Louis, Mo., May 14, 15, and 16, 1884.

Second Day—Morning Session.

Vice-President Lansden called upon Mr. Thomas A. Bates, of Cairo, Ills., to read his paper on

SYSTEM—DOES OBSERVANCE OF IT, IN AND ABOUT A GAS WORKS, PAY?

The remarks I may make on this topic will be necessarily brief and plain, and should be understood as applying more particularly to works of the smaller class, where the duties of a superintendent are so numerous, and the opportunities for procuring what we might term "skilled labor" so few.

It is a trite and true saying that more money is made or lost for a gas company in the retort house than elsewhere. A criminal neglect of street mains and services might make an exception to this rule. Then let the superintendent have all the details of this branch of his profession at his fingers' ends and under his personal supervision.

We assume that he has the best settings that circumstances will admit. Keep in some convenient place, on slate or board, the time for charging designated retorts, with amount of coal to be used also noted; alteration of the same to be made only by himself, except in an emergency. So time your visits to the works that the results may be seen, not depending on mere statement that No. 1 or No. 2 will or will not carbonize such an amount of coal. Have every convenience you can devise to expedite the drawing and charging of retorts, and for cooling and removing coke. See that wagons, barrows, rakes, scoops, shovels and bars are of the most convenient size, weight, and shape, and always in good repair.

Impress upon the men the fact that if they will have a given place for every tool, and keep it there when not in use, their work will be more easily and speedily accomplished. Insist that they shall be quite ready to complete a charge before commencing the operation. It looks bad, to say the least, to see a stoker, after loosening and throwing open the retort lids, walk to one end of the house for a tool to clean standpipe, back to the other end for a bar to clean lid and mouthpiece, then going out into the yard for a drawing rake; finally, when ready for charging, the loaded coal wagon must be wheeled from a distance several times greater than need be, with the consequence that much time is wasted and the stoker's labor is materially increased.

Let your men have the needed tools to the right and to the left, coke and coal wagons right up to the work, and they will soon find out how to take few unnecessary steps during a drawing and charging operation.

The charge completed and a reasonable breathing spell taken, sweep up and make ready for the next one, letting the resting interval come before rather than immediately after a charge. Attention to these simple rules will benefit your men and tell on the station meter.

A word, now, for the purifying room. The labor here is likely done by one who has also to look after the yard, crush coke, pump tar and drips. His duties are varied and liable to interruption. Endeavor to avoid this as much as possible, and to have him keep well ahead of his work.

Pay close attention to the preparation of lime (if you use it) for your boxes. The difference in results from lime properly prepared and placed on trays, contrasted with same carelessly done, is something startling.

In visiting the exhauster and meter rooms, note carefully the condition of all gauges and cocks; a brief but careful scrutiny will tell whether they are working freely or closed by deposits. It is better to devote a short period of time at stated intervals to cleaning these small openings than to run for days, or even weeks, unable to say whether you have a half inch vacuum or a two inch pressure on hydraulic main, or whether the water line of meter was within an inch or two of being correct. In other words, when you visit the works (and the oftener the better), let it not be for show nor a hasty walk through the buildings, but rather to closely observe the working of the various details, discovering every instance of neglect, pointing out the remedy, and giving explicit instructions for the day's routine.

Every superintendent is aware of the importance of a perfect system of regulation of pressure; but, in my trip through the country, I know that in many places pressure conditions are not strictly watched. If a time-table be kept, varied with the changes of season, and the men enjoined to a strict observance of it, you will have but little trouble in securing regulation of pressure with almost clock-like precision. A gauge in the bedroom puts a check on neglect. You will not have cause to complain very often of neglect on the part of your workmen when they know that, day or night, you are liable any moment to look at the gauge.

Now for street work. After deciding what pipe and fittings are required, and procuring same, provide as many sets of trenching tools as the magnitude of the work demands—one for each man. It is poor policy to have one man waiting for the next one's pick or shovel. Have a good supply of small tools for cutting, yarning, and leading. Keep broken ones replaced, and all in good repair—a dull pick or half-worn shovel is a dead loss. Decide to pay your diggers the wages paid the best laborers in town. Lay off your trench in sections of, say, 12 feet; put one man on each, having a well-known good worker to the front. See that all are ready to take new sections when he does, unless there be some unusual obstruction in some particular place; but leave off from the pay-roll those who fail to keep up. A poor worker in a gang is such a drawback that it were better—if he must be kept—to pay him for resting on some lumber pile.

After a sufficient length of pipe is laid, joined, and tested, move back just enough men to fill in, keeping them at that as the work progresses. Avoid the frequent moving around of the workmen. By use of a rubber bag, or, better still, hog's bladder, toughened by immersion for a week in tan vat liquor, you can test pipe at will and keep the fillers close up with the pipe layer.

I once saw a practical test of the triumph of system on street work over the hurry and bluster method. Lines of water and gas mains of equal size, and laid at same depth, were being run on parallel streets two squares apart. The water works gang was a trifle larger, but did not consist of picked men, the wages paid ranging from $1.50 to $1.60 per day. The gas works main-layers were chosen men, and paid $1.75 per day. The latter, without extra effort, completed day after day fully one-third more work than the former, and in a more perfect manner.

These same methods will apply to all street work undertaken by a gas company. It has been twice my good fortune to compare, from actual figures, the difference in cost of labor performed in and about a gas works, and the general street work, under the two methods—the systematic and the haphazard way. The result was a saving to the company, in one instance, of ten per cent., and in the other nearly twelve, for approximately the same labor performed.

Experience has long since decided, to my satisfaction, that observance of rules of system and order not only makes the surroundings of our works more pleasing to, and lessens the labor of, our men, but financially benefits the company whose interest is intrusted to us.

Mr. King moved that a vote of thanks be tendered to Mr. Bates. The motion was agreed to.

The next business in order was the presentation of a paper by Professor Silas H. Douglas, of Ann Arbor, Mich., on the subject of

THE RELATIONS OF CHEMISTRY AND PHYSICS TO THE MANUFACTURE OF ILLUMINATING GAS.

At the hazard of being pronounced a bore to the Association, I propose to call your attention to some of the relations of the science of chemistry and physics to the manufacture of gas for illuminating purposes. In treating of the subject I shall, however, endeavor to make it as plain and simple as is practicable, by the avoidance of all unnecessary technical terms; and, if the Association will bear with me, I hope before I close to make some valuable suggestions and practical applications of the truths disclosed by these sciences to the work of our calling.

In that endeavor, let me ask, first, what constitutes a light-giving material, and what is the chemical constitution of all the sources of artificial light? If we analyze the substances used for the production of artificial light we shall find them to be invariably of an organic origin, or the products of vegetable or animal life. They will be found to be composed of slightly variable proportions of carbon, hydrogen, oxygen, and nitrogen—carbon and hydrogen existing in the greatest abundance, and being the most important constituents. If these organic substances, as wood, oils, coals, etc., are subjected to destructive distillation they are broken up into other and more simple compounds, variable in their nature and composition according to the degree of heat to which they are exposed. Again, if wood or other organic substances be permitted to decay slowly with a limited supply of oxygen or air, as when buried in the earth or beneath water (illustrated in stagnant pond holes), they will emit certain gases, the most important of which is light carburetted hydrogen, having the chemical formula of CH_4, or a gas containing an excess of hydrogen. This gas is highly combustible, but burns with a very faintly luminous flame.

Again, all the varieties of coal have been found in the same manner—they are the products of vegetable decomposition with a limited supply of air; the more highly bituminous coals being those of the most recent geological period, or containing the greatest quantity of hydrogen. These bituminous coals are undergoing a natural process of distillation, as is shown by the gradual emission of carburetted hydrogen (the fire damp of the mines), and passing into the anthracite coals, and finally the diamond—the anthracite and the diamond being nearly pure carbon, the hydrogen having all escaped in combination with a small quantity of carbon.

The following table will illustrate the composition of these different gas producing materials. In this table the carbon is kept up to a standard of one hundred.

	Carbon.	Hydrogen.	Oxygen.
Wood	100	12.18	83.07
Peat	100	9.85	55.67
Lignite	100	8.37	42.42
Bituminous coal	100	6.12	21.23
Anthracite	100	2.84	1.74

If we subject the wood or bituminous coal to a high heat it will undergo destructive distillation, the hydrogen passing off as before, in combination, however, with a greater amount of carbon. We shall have more or less olefiant gas—a gas that will now burn with a highly luminous flame. The products of this decomposition will be illustrated by the following table, where the hydrogen is maintained at one hundred:

Temperature.	Hydrogen.	Carbon.	Name of gas.
Dull red heat	100	614	Principally olefiant gas (C_2H_4).
Red heat	100	580	
Bright red heat	100	472	Olefiant gas (C_2H_4) mixed with marsh gas (CH_4).
White heat	100	325	Marsh gas (CH_4).
Continued white heat	100	7	Nearly pure hydrogen, carbon deposited.

If we examine a luminous gas flame with care we shall find the following chemical and physical changes to take place: In the first place, the hydrogen, being the more highly combustible constituent of the gas, burns at the expense of the oxygen of the air. This combustion of the hydrogen sets free the carbon, which particles of carbon, enveloped in the colorless flame of burning hydrogen, are heated to incandescence and emit the light; the carbon is subsequently burned in the upper portion of the flame, and converted into carbonic acid. If from any cause the oxygen is insufficient to unite with the carbon, it will escape as free carbon, or we shall have the smoky flame, as is illustrated in the Argand burner burning too high, or in gas too rich in carbon. If we supply to the flame an excess of oxygen, or air, the hydrogen and carbon are both consumed simultaneously, and we have a flame without light, for the reason that there is no free carbon to be heated to incandescence. This is illustrated in those gas burners used for heat alone. Again, if we ignite those hydrocarbon substances that contain an excess of carbon, as oil of turpentine, they will burn with a broad, sooty flame. If we mix with the turpentine some fluid that shall contain an excess of hydrogen, we shall have the highly luminous burning fluid, camphene.

In the oxy-hydrogen blowpipe we have the hydrogen and oxygen burning with an intense heat, but giving absolutely no light. Thrust into this flame a piece of infusible lime, and it is instantly heated to the point of incandescence, emitting a light of the intensity of the electric arc, and called the Drummond light. The Brush electric light, and all that family of electric lights, derive their brightness from the carbon points heated to incandescence by the electric current, no part of the light coming from the electric current itself.

From all this we gather one practical truth—that all gas flames derive their light solely and entirely from the presence of carbon in the combustible gas, and that there must be certain definite proportions of carbon and hydrogen in order to give the best illuminating results.

Now, it has been found that the nearer we approximate the composition of olefiant gas the more perfect will be the illuminating gas. It is not practicable to manufacture olefiant gas on a large scale with economy; we can, however, by proper manipulation, increase or diminish the rich hydrocarbon compounds, and thus greatly improve the gas obtained from bituminous coal. This is shown by the tabular statement of the gases emitted at different degrees of heat heretofore given.

Let us examine, for a moment, the leading constituents of coal gas. First, we have the hydrogen, forming from 10 to 15 per cent., and derived, no doubt, from the decomposition of the water contained in the coal. This is a colorless, invisible, incondensable and highly combustible gas, but burning without the emission of light. Second, marsh gas, or light carburetted hydrogen, likewise a colorless, incondensable, highly inflammable gas, but burning with feeble luminosity, having a composition of CH_4. Coal gas contains from 30 to 60 per cent. of this gas. Third, olefiant gas. This is the most important of all the constituents, having a composition C_2H_4. Gas of fair quality will contain from 4 to 5 per cent., while rich cannel gas will contain from 20 to 30 per cent. It is a colorless gas, having an ethereal odor and taste, non-poisonous, but possessing strong anæsthetic properties. It is absorbed somewhat by water, especially if the water is cold; and hence excessive scrubbing will diminish the illuminating power of gas, inasmuch as its light-giving properties are due largely to the presence of this constituent. At a white heat it is decomposed with the formation of light carburetted hydrogen; and consequently excessive heats of retorts are to be avoided, to prevent this decomposition of the olefiant gas, and thus depriving the coal gas of its most valuable illuminating constituent, and causing a deposit of carbon on the interior of retorts.

Again, if we examine the tabular statement heretofore given, we draw valuable practical conclusions as to the best heats for benches to obtain gas of the greatest illuminating power, as well as an illustration of the evil that results from an effort to obtain the greatest possible amount of gas from a given quantity of coal. At a bright red heat we find the olefiant gas escaping, mixed with more or less of marsh gas; while at a white heat we have marsh gas alone given off; and at a continued white heat we have nothing but pure hydrogen.

It is the custom with many gas engineers to run five-hour charges at high heats, and thus extract the greatest possible quantity of gas from the coal, regardless of its illuminating properties—the ambition of the gas engineer seemingly being simply to obtain a large yield, to the direct damage of the interests of the consumer and the credit of the company with the public. This tabular statement demonstrates clearly that the charges should be withdrawn at the end of at most four hours, and while the coal is still yielding up its volatile constituents. Were the truths of this tabular statement heeded more frequently than they unfortunately are, we should have less complaint from the public of the quality of gas, and be better prepared to compete with that other illuminant, the electric light.

In addition to the permanent gases entering into the composition of coal gas we have certain highly volatile hydro-carbon compounds that it is of the first importance to preserve. Benzole, having a boiling point of 176°, is one of them, and the most important, and will serve to illustrate the principle involved in the whole family. Contrarily to what is ordinarily supposed, the solid, liquid and gaseous states of matter are not separated from each other by any sharp line of division, but gradually pass from one to the other by insensible gradations. All substances are emitting variable quantities of vapor or gas at all temperatures, and under all pressures. At what is known as the boiling point they are completely converted into gas. To illustrate; if we take a barometer tube 31 inches in length, filled with mercury, with the open end immersed in a vessel of mercury, the mercury willl stand at 30 inches in height, the upper inch will apparently be empty, but actually contains the vapor of mercury. If we now introduce, into this tube, a few drops of water, the mercury will immediately fall ½-inch, a portion of the water being converted into vapor or gas, and the space above the mercury will be filled with the vapor of water and mercury. If we now raise the temperature of water to 212°, the liquid mercury will be driven entirely from the tube, by an increase of the vapor of water. If we take another tube and pass into it a little alcohol the mercury will be depressed as before, but to a greater degree; and if the temperature is raised to 150° the mercury will be driven from the tube which will be filled with the gas of alcohol and mercury. If we take still another tube and pass into it benzine, the mercury will fall, and at 176° we shall have the tube completely filled with the gas of benzine and mercury.

Now, what I desire to impress upon the Association is the fact or law that all these hydro-carbon liquids send off their vapor at all temperatures, the higher the temperature the greater the elastic force of the vapor, and consequently the greater the quantity existing as a gas.

There is another important law, namely, that all the gases expand irrespective of each other. If we remove the stopper of a bottle we shall find the benzine escaping into the air as gas irrespective of the fact that the room is already filled with another gas—the atmospheric air. From all this we derive a valuable practical conclusion. Dr. Letheby found that for every grain of benzine contained in a cubic foot of coal gas, the illuminating power was raised 10 per cent. And how, then, are we to preserve this benzine and other valuable hydrocarbon compounds as a constituent of gas? We may do it—

First. By avoiding the too sudden condensation by exposure to cold, thus diminishing the elastic force. We should use long lines of condensers, and keep their temperature as high as practicable.

Second. We should avoid the scrubbing of the gas by an excess of water, especially of cold water.

Third. We should keep the atmosphere of our purifying room at a temperature of 60° or thereabouts.

Fourth. We should keep the temperature of our holder well up by housing it in, and by the introduction of steam coils for heating purposes.

Fifth. We should lay our street mains below the influence of frost.

The influence of temperature on the illuminating quality of gas may be illustrated by passing gas through U-tubes surrounded by a freezing mixture; the gas will be found to be almost non-luminous, and the tube, after a time, filled with these liquid hydrocarbons.

What will take place in this tube will take place in our cold condensers, washers, purifying boxes, gasholders and street mains, only to a lesser degree, inasmuch as the elastic force of the hydro-carbons is greatly diminished by change of temperature, but not lost.

If the principles here laid down are true, and they cannot be controverted, the absurdity of the numerous patents for the economical production of water gas must be apparent to all; they can have no value whatever for the following reasons:

First. The decomposition of water can furnish nothing but oxygen and hydrogen. The hydrogen will burn, but with an absolutely non-luminous flame; there is no carbon there to be heated to incandescence.

Second. The water is decomposed by driving steam through incandescent anthracite coal; the hydrogen escapes as hydrogen, while the oxygen unites with the carbon to form the lowest degree of oxidation with carbon—a combustible but non-luminous gas. These two gases, hydrogen and carbonic oxide, pass out of the converter. To render them luminous in their combustion they must be supplied with carbon, and this is done by a mechanical mixture of the vapor of naphtha or some volatile hydro-carbon compound. The vapor of naphtha thus mechanically mixed is prone to great fluctuations in quantity from change of temperature, and has not been successfully preserved as a constituent of water gas through the cold seasons.

Whether it is more economical to manufacture luminous gases, or the carburets of hydrogen, by the direct distillation of bituminous coal or the decomposition of water at the expense, first, of steam, then of anthracite coal, and, lastly, carbonizing the gases so produced at the expense of naphtha and the risks of condensation, before it reaches the consumer, I leave the members of the Association to judge for themselves. The fact that a large percentage of water gas is the highly poisonous carbonic oxide, I make no account of, for the reason that this is a subject foreign to the object of this paper.

Purification.—In the work performed by the purifier some important chemical and physical principles are involved worthy of our careful consideration.

The gas, as it reaches the purifiers, besides the carburets of hydrogen, contains more or less of the sulphur compounds and carbonic acid, which must be separated as far as is practicable before it reaches the holder and consumer.

The more common way of separating the sulphur compounds and carbonic acid is by the use of lime on the screens of the purifier. The lime is placed upon these screens, slacked with sufficient water to render it pulverulent and slightly adhesive. As the gas comes in contact with the lime a carbonate of lime is formed while the sulphur of the sulphuretted hydrogen unites with the lime to form a sulphide of lime (Ca S) and, when super-saturated with sulphur, it is removed from the purifier as an absolute waste product and a nuisance. It cannot be revivified by any known process. Again the pasty and tenacious condition of the lime gives a large amount of back pressure, which is at all times desirable to avoid, especially when no exhauster is used.

Another mode of purifying gas, which is coming quite generally into use, is by placing upon the screens ferric oxide in some form, either produced by oxidation of iron turnings, or artificially prepared oxide, or the native forms of oxide. In this case, the sulphur unites with the iron to form a sulphide of iron. This change may be represented by the following chemical formula:

$$Fe_2O_3\ 3HO + 3HS = 2FeS + 6HO + S.$$

In other words, a ferrous sulphide is formed. On removing this material from the screens, and exposing it to the air, the iron again passes, by the absorption of oxygen from the air, to its original condition of ferric oxide ($Fe_2\ O_3$) and the sulphur is left in a free state, as is represented by the following formula:

$$2FeS + 3HO + 3O = Fe_2O_3\ 3HO + 2S.$$

In other words, it is revivified and is prepared for use a second time.

This process of revivification may be continued again and again, until it is so charged with free sulphur or tarry material as no longer to be effective.

Now the question arises in connection with iron purification. What is the most available form of ferric oxide? An examination of the artificially prepared ferric oxide will show it to be more or less granular, or in a form to imperfectly expose the oxide to the action of the gas and also to obstruct, to a greater or less extent, the free flow of the gas and produce back pressure. This evil of back pressure is avoided by mixing the material with sawdust.

At a meeting of the Association, held at Cincinnati, Ohio, a year ago, I called attention to a form of natural ferric oxide found in the vicinity of Ann Arbor, Michigan, deposited from certain springs in which it is held in solution as a ferrous salt, but by exposure to air becomes an insoluble ferric oxide. As deposited in this locality, it is somewhat mixed with clay and lime, the water being a hard water from which it is deposited. I here present to the Asssociation three samples obtained from different localities, but all of the same origin, and, as far as my observation goes, somewhat peculiar to this locality.

By analysis No. (1) contains 63.4 per cent. ferric oxide.
" No. (2) " 40.54 " " "
" No. (3) " 38.71 " " "

An examination of these samples will show them to be either in the form of a fine powder, or spongy in their structure.

This material has been used exclusively, and with entire success, at the Ann Arbor works, for about eight years. Its superiority as a purifier consists:

First. In its being in a finely divided state, thus exposing a great amount of surface to the action of the gas.

Second. In its rapidly and completely revivifying on exposure to the air after leaving the purifier.

Third. Its open and porous nature allowing the gas to pass through it with the least possible back pressure—the back pressure being only .2 of one inch.

Fourth. It contains an admixture of clayey matter, which increases its absorptive power of certain impurities on the same principle as the earth closet.

Fifth In its removal of the carbonic acid. The objection heretofore made to iron as a purifier is its failure to remove the carbonic acid; and hence the use of lime on one of the screens wherever ferric oxide is used.

By actual analysis of gas purified with this material it has been found to contain only the .26 per cent. of carbonic acid—too small a quantity to be of any consequence. The removal of carbonic acid I would explain upon the well known principle of adhesion. This is illustrated in the power of many finely divided substances to absorb the gases and hold them in a condensed form; thus charcoal, by the force of adhesion, will take up 90 times its own volume of ammonia, 35 times its own volume of carbonic acid. Take a piece of platinum sponge and introduce it into a mixture of hydrogen and oxygen, the adhesion of the sponge to the two gases is such as to bring them into contact with each other in so condensed a form as to cause them to unite and heat the sponge to such a degree as to explode the mixture. The clay contained in this material has the same absorptive power and removes the carbonic acid as well as the ammonia from gas. The absorptive power of clay, in a finely divided state, for ammonia and carbonic acid is recognized by every scientific farmer, where the ammonia and carbonic acid are absorbed by the soil and minister to the growth of the crop.

The practical experiments which I have made as to the volume of gas which this material will purify show that 70 pounds will purify upwards of 200,000 feet.

Discussion.

Mr. King—I would like to ask Prof. Douglas a question that may not seem exactly germane to the subject; but I would like to have an opinion upon it. At the last meeting of the New England Association of Gas Engineers it was rather conclusively shown, as I remember it, that the use of hydrocarbon oils as an enricher was productive of decided injury to the meters; it was also intimated that the meters measuring water gas did not last as long as those passing coal gas. Since these discussions have taken place I made inquiry of two meter manufacturers whether, in their experience, the life of a meter passing water gas was less than that of a meter passing coal gas. The answer received from both of the gentlemen was that there could be no doubt of the fact that the meter passing coal gas would last much longer than one passing water gas. Now, if this statement be true, I would like to ask Prof. Douglas how he accounts for it.

Prof. Douglas—I have never made any experiments in this direction, but might say that I have heard the same thing. Portions of the naphtha enriching material are carried forward not in a thoroughly gaseous state, but simply as vapor. In such situations I think the vapor would act upon the meter diaphragms, and gradually destroy them. Practically, I have no knowledge of the question, and speak only from pure theory.

Mr. McMillin—I would draw the inference from the paper of Prof. Douglas that it would not be possible to obtain the best results as to illuminating power when running at high heats. His paper tends to discourage the employment of high heats. I would like to ask if he does not think it is possible to run his retorts up to a high heat, and, by placing his charge well back in the retorts, having a foot or two of highly heated surface in front of the charge for the tar to run over and distill, that he might send off the hydrocarbons of the tar into the gas, and keep them there, instead of allowing them to go to the tar manufacturer, and still obtain a high yield with a high illuminating power?

Prof. Douglas—My opinions on that question are very decided, and I think the tabular statement given in my paper proves my position. If we take good illuminating gas, rich in carbon, and pass it through a tube heated to white heat, it will come out as hydrogen with no illuminating power whatever. In other words, the gas coming in contact with a retort at white heat will deposit its carbon and pass on simply as hydrogen. Back pressure has not so much to do with it as is ordinarily supposed; the source of the difficulty is in running our heats too high. Under these circumstances we decompose the carbons that should be passed on in the gas instead of being deposited on the surface of the retort.

Mr. McMillin—I agree with everything Prof. Douglas has said, but he does not go far enough. You decompose your hydrocarbon in the back of the retort, where it is extremely hot, and in that decomposition you have increased your volume very largely. Now, can you not enrich it in the front end of the retort by taking the benzole out—just as the water gas man enriches his carbonic oxide with naphtha?

Prof. Douglas—I think not, because, through contact with the hot surface of the retort, decomposition ensues and the carbon is deposited.

Mr. McMillin—As a rule the heat is not very great at the front end.

Prof. Douglas—You might, perhaps, put it in the coolest part of the retort; but, in passing through the vessel, to a certain extent it is brought in contact with the white heated surface. Wherever such contact is made the gas parts with its carbon in the shape of carbonaceous incrustation.

Mr. McMillin—On the front end of the retort, of course, you can come to a point where it is actually black, and not hot at all.

Prof. Douglas—But before that point is reached more or less contact with other parts of the surface has been made.

Mr. McMillin—Before that point is reached I propose to have the distillation accomplished. You may take up all the light oils, having nothing left but pitch. It does not necessarily follow that deposition takes place—in that case we would get no illuminant. Leave all the carbon behind and there would be nothing save hydrogen to go ahead.

Prof. Douglas—Let me refer you to the tabular statement, which I think is important. At a dull red heat we have olefiant gas given off; at a bright red heat we have olefiant gas mixed with marsh gas, or light carburetted hydrogen; at a white heat we have nothing but marsh gas given off, which is non-luminous, or nearly so; and with continuous high heat we have nothing but pure hydrogen. These are actual facts. Now, apply them to your heated carbonizing vessels. At a red heat the benzole, naphtha, tars, in fact all the luminous constituents of the coal are converted into a mixture of olefiant gas and marsh gas or ordinary coal gas. For the same reason, if you run your charges over four hours you get, at the end of the last hour, a gas almost non-luminous.

Mr. McMillin—There are some engineers who adhere largely to 5 hour charges. I do not know that the Professor's rule will apply to them strictly. When 5 hour charges are run, the weight of the charge is largely increased; at least I so understand it. Now, if you place in a white heated retort a charge that will take 5 hours time for carbonization, that retort does not remain at a white heat very long; it cools down. As long as the gas is passing off the heat is being rapidly conveyed away; still this result hardly follows because the charge is in 5 hours.

Prof. Douglas—Very true; if you place a large weight of coal in a retort heated to whiteness at the outset, it will not be long before the temperature is brought down to a dull red, or at the temperature where the best illuminating gas is produced. What I am talking about is the absurdity of introducing coal into a white heated retort, and maintaining that white heat, after all the luminants have been extracted, with the expectation that the last vapors from the charge will have any illuminating value.

Mr. McMillin—In regard to the benzole vapors, it seems to me we send them all into our tar. Our tar distillers reap the benefit therefrom. If we can extract benzole from the tar, during the process of carbonization, in one way or another, I fail to see why we cannot enrich our gas as is done in the water gas process, and still obtain a good yield—in other words, get a yield of 5 feet to the pound, and of as good illuminating power as when getting only 4½ feet.

Prof. Douglas—You say that we get benzole in our tar. In the ordinary mode of gas making I grant that is true; and it is so for the reason which I gave in my paper—the result of bad condensation. The trouble is condensation is effected too suddenly. Instead of maintaining the condensers, washers, purifiers and holders at as high a temperature as is possible, and keeping the gas in lengthened contact with the uniformly heated apparatus, the gas is usually hastened through these vessels when they are at too low temperatures. In the works I am in charge of I formerly paid no attention to this matter. I had a multitubular condenser, and the gas was of bad quality—the reason for its poor quality being that it was condensed too suddenly. When this state of affairs forced itself upon my attention (and you may rest assured that I was not slow in endeavoring to trace the matter up) I tried to keep up the temperature of this multitubular by surrounding it with hot water; but this plan did not answer the purpose. I then extended the hydraulic main, and passed the gas through 300 feet of 18-inch pipe before it reached the condenser; the result being that, instead of a 16-candle gas, which was the best I could do before, I now obtain a candle power varying from 20 to 22 candles. My purifying room is also kept at a uniform high temperature through the aid of a system of steam coils; the holder, being housed in, is warmed by the same process, so that I do not allow any portion of the gas, if I can possibly avoid it, to reach a temperature much below 60°. I think the secret of my high candle power is explained in that way.

Mr. Smith—When getting this high candle power, do you get as great a yield per pound of coal carbonized?

Prof. Douglas—No, sir; I do not. I leave a portion of the gas in the coal; but I consider that portion so retained is worthless, and nothing short of an imposition or a fraud on the consumer did I seek to extract it and sell it to him.

Mr. Somerville—I think the trouble is not to be solely attributed to high heats. Of course, I can fully corroborate Professor Douglas in his remarks on that subject—indeed all of us here present can bear testimony to the truth of his statements. In my opinion, the light benzoles are more often lost to us as illuminating constituents after the gas has left the retort; and the most fruitful source of such loss is in plunging the gas too suddenly into the multitubular condenser. This opens up a very interesting field. The Professor did not mention it, but these light naphthas seem to have the property of preventing the deposition of naphthaline; and I will venture the assertion that he is not bothered with naphthaline stoppages in his works.

Prof. Douglas—I do not know what they are.

Mr. Somerville—That is the secret of it. The gas is denuded of the light naphthas, in the first instance, by running at extreme high heats; and, secondly, and in greater measure, by a too rapid plunge in the multitubular condenser, or some similar contrivance. Gas should be dealt with gently; it ought not to be "shocked." The operation of condensation should be gradual and gentle. Why, a few days before I left Indianapolis, the weather temperature jumped up suddenly, and the effect of the heated air perfectly corroborates the Professor's statements. The candle power of my gas went up a candle. I had not contributed in any way towards the increase. I had neither used more enricher, nor varied the kind or quality of coal in any manner. The gain was simply on account of the warmer weather; the temperature of the purifying room had increased, and the lighter hydrocarbons were coming along with the gas to the photometer. On the other hand they are either baked down on the retort bottoms or sides, or are pumped out at the street drips.

Mr. McMillin—I most heartily indorse all that has been said concerning the importance of gradually cooling our gas; and I have always been a consistent follower of such a practice. I have the much abused multitubular condensers, but am able to regulate the temperature without trouble. I go even further than Professor Douglas's practice. I run my gas through 400 feet of pipe (most of it underground) before the multitubular is reached. I have a great number of thermometers placed in available positions, ranging from the end of the hydraulic main to the station meter; and there is nothing else that I watch with greater vigilance than the temperature of the gas while passing certain stated points in the apparatus. I try to regulate it by the use of various devices. I experiment every little while by noting the effect of sudden cooling. It is possible for me to cool the gas down, say from 145° at which it enters the multitubular, to 80° within a distance of 50 feet, and I have perceived immediate loss in illuminating power of as much as 1¼ candles as a consequence of the experimentation.

Prof. Douglas—I should have added that the pipe I spoke of, through which the gas traverses in its voyage to the condenser, is in the warmest portion of the retort house, most of it lying directly over the benches, so that it gets the full benefit of whatever heat is ascending from the stacks; and is therefore kept at a pretty high temperature. I think the U-tube experiment, mentioned in the paper, is a perfect demonstration of the detrimental effect of cold on the illuminating power of gas. Passing gas through a tube immersed in a freezing mixture destroyed its candle power—the benzole and light naphthas being deposited in the bend.

Mr. Moran—Perhaps the Professor would explain the cause of certain stoppages that have caused me much bother. It seemed to me that a likely cause for the trouble existed in my purifying arrangements (as these obstructions generally occur between purifier outlet and holder inlet) still I can hardly reconcile them with that theory, as all possible care is taken in that department. I would like to inquire what degree of temperature should the gas be at when entering the boxes.

Prof. Douglas—I keep the temperature of purifiers at about 60°, and endeavor to keep the heat of the purifying room at the same figure.

Mr. Moran—You misunderstand me, Professor. What I wish to know is what should the temperature of the gas itself be at immediately before or upon entrance into purifying material?

Prof. Douglas—I should say from 60° to 75°. In passing the gas through multitubular and condensing pipes it should be maintained at a temperature close upon 60°.

Mr. Moran—How about below 60°?

Prof. Douglas—I should prefer rather to have it above 60° than below that figure.

Mr. Somerville—The temperature of the purifying house room can easily be told by reading the thermometer. Keep your gas at from 7° to 10° higher in temperature than the atmosphere of the room, and you will be doing about what is correct.

Mr. Cosgrove—I would like to ask the Professor if he uses an exhauster?

Prof. Douglas—No, sir; I do not.

[The convention appeared heartily interested in the paper presented by Professor Douglas, and close attention was given to the ensuing discussion, at the conclusion of which a hearty vote of thanks was extended to the author.]

[To be continued.]

Inaugural Address of Mr. Robert Harris, M.I.C.E.

Mr. Robert Harris, M.Inst.C.E., President of the Gas Institute, recently delivered the following inaugural address at the Twenty-first Annual General Meeting of that body. For our report of the same we desire to make acknowledgment to the *Journal of Gas Lighting:*

Gentlemen—On taking the chair on this occasion, and before such an audience as it is now my privilege to address, I feel that it is my first duty to thank you for the honor you have conferred upon me by electing me as your President; and (bearing in mind the assistance that you have afforded to my predecessors in this office) to crave similar help on behalf of myself. With your kind co-operation, I trust to be able to conduct this meeting to as successful an issue as has characterized the gatherings which have preceded it.

The Institute, in combination with the Association from which it has been developed, this year attains its majority—the present being its twenty-first annual session; and it is, I think, a very appropriate period at which to review its past history. To many of you this is more familiar than it is to myself; but to the younger members—and more particularly to those young in age as well as membership—a knowledge of what has been done in the past will possibly be not only interesting, but will incite to increased exertion to attain as good, if not better results in the future. Having, so to speak, passed through the period of infancy and childhood, and having arrived at the dignity of manhood, more will be expected of the Institute in its mature years than it has yet accomplished; and it must be the duty of the members to cause these expectations to be realized, by careful study of their profession in their own practice, and by bringing the results of their studies before the world at the meetings which will be held in the future.

Under the name of the British Association of Gas Managers, the Institute was founded in the latter part of the year 1863, for (to quote the words used as being the objects of the Association) "the encouragement and advancement of all matters connected with gas engineering, manufacture, and finance, and to facilitate the exchange of information and ideas among its members." Its first general meeting was held on the 11th of May, 1864, at the Mechanics' Hall, Manchester, under the presidency of Mr. A. O. Atkinson, of Hull. At that meeting there were present 39 gentlemen connected with gas manufacture from all parts of England; the late Mr. J. Blackburn (whose death, two years ago, we had so deeply to deplore) acting as Honorary Secretary. The business before the meeting was the framing of the rules, which had been drafted by the Provisional Committee, for the regulation of the affairs of the Association. The rules then drawn up and agreed to remained substantially the same, until the increasing magnitude and importance of the Association demanded their revision, which was done at Birmingham in the year 1881, under the presidency of Mr. Hunt.

The first President of the Association was Mr. Thomas Hawksley, C.E.—a gentleman who is well known to most of you, either personally or by repute, as very eminent in his profession, and who, I am happy to say, is still pursuing his active and useful career. While remaining one of our honorary members, he continues to exhibit an interest in the welfare of the Institute up to the present time. With him was associated as Vice-President the late Mr. T. G. Barlow, C.E.—probably best known as the Editor of the *Journal of Gas Lighting*, although also eminent as a gas engineer—and seven members of committee; the greater number of whom have, alas! after serving the Association faithfully for longer or shorter periods, passed from among us. All honor be to their memory! The first paper read before the Association was very appropriately (as being the first operation of gas manufacture) one on "Settings of Clay Retorts and Ovens of Clay and Iron," by Mr. Hislop, of Ayr. This was followed by one by Mr. Goddard, of Ipswich, on "The Application of Gas as a Motive Power;" and the business of the meeting was brought to a conclusion by a lecture from the late Dr. Letheby, "On the Chemistry of Gas Lighting."

The next meeting of the Association was held at Birmingham, on May 31 and June 1, 1865; and in the following year the first meeting in London was held at St. Martin's Hall, Long Acre. From that period until to-day the meetings have been held alternately in London and in the provinces. The sister Kingdoms of Ireland and Scotland have each been visited once; the meeting having been held in Dublin in 1871, and in Edinburgh in 1873. They have also been held in the principal large towns of England.

The presidential chair has been most ably filled at all times by gentlemen of great eminence and experience, who have brought their knowledge to bear so as to promote the prosperity of the Association. The effects are seen in the position which the Institute occupies at the present time. At the meetings all matters relating to the objects set forth at the inauguration of the Association, as well as many others bearing upon our special industry, have been brought forward in papers of a more or less exhaustive character, and discussed with the knowledge existing upon the subjects of them at the time. The recorded transactions of the Association, and latterly of the Institute, thus form a record of the history of our industry during the last 20 years, as well as contain an immense amount of practical information upon almost every subject that particularly interests gas engineers and managers. I recommend them as books of reference to all seeking information on matters connected with the gas industry.

In the year 1881, in consequence of the increasing magnitude and importance of the Association, it was found desirable to thoroughly revise its constitution and rules. The result was that from that date the old British Association of Gas Managers ceased to exist, and The Gas Institute became its successor; being established upon a broader basis, and empowered to extend its operation, and thereby become more powerful for good. The new rules have, on the whole, worked well; but there are some alterations which, as you will have seen by the report of the Council, they now deem it desirable should be made.

At the last meeting, at Sheffield, the papers were upon very important subjects; and two of them upon matters which may be said to be the most interesting to the gas engineers of the present day. I allude to the one by Mr. Foulis, on "Siemens' Regenerative Furnaces at Glasgow;" and the one by Mr. F. Livesey, on "Sulphur Purification." The former is a subject which is engaging the attention of the most eminent engineers, and is one which, in connection with burning the fuel in a gaseous form, is calculated to produce a greater revolution in the process of gas manufacture than anything that has been introduced for many years.

It has long been a study of thoughtful minds that, in all retort-settings, a necessarily large amount of heat was wasted. I say "necessarily," because, in order to extract the gas from coals, a certain minimum temperature is required. The last retort against which the fire plays must be of this temperature; the fire itself being consequently higher. This may be taken at 2,000° Fahr., and the heat required to produce a draught in the chimney is not more than 600° Fahr.; consequently, all the heat between these two points is wasted. It is the object of the regenerative flues to extract this heat from the outgoing gases, and return it to the furnaces as heated air, to be again utilized in heating the retorts. With furnaces burning solid fuel, this regeneration presents considerable difficulties; but, since the introduction of gaseous fuel, these difficulties appear to be in a fair way for removal. It does not at present appear to be finally determined which is the best form of furnace; there are several before the public. You will find the whole subject most ably treated by one of our Past-Presidents (Mr. C. Hunt) in a paper read by him before the Midland Association of Gas Managers at Birmingham in February last. In the paper promised to be read at this meeting by Mr. Valon, we shall doubtless receive considerable addition to our store of information upon this very important subject.

The other paper to which I have referred—viz., that on "Sulphur Purification"—is one which is becoming of increasing importance, as more Private Acts of Parliament continue to be passed, containing what are known as "sulphur clauses." As mentioned by Mr. Livesey, there are several methods of dealing with this subject, which differ only in detail; the broad principle underlying all being that sulphide of calcium is the active agent in removing these sulphur compounds from the gas. The variations in the methods of using the sulphide of calcium are determined by local circumstances, such as the arrangement and number of the different purifying boxes, the proximity of the works to dwelling-houses, and the facilities for removing the spent lime when it has done its work. My own system, which is in operation at Bow Common, and which was the first successful attempt to remove the sulphur compounds by means of sulphide of calcium, is the same as that with which I started in the year 1867; and I have not yet seen anything to surpass it for efficiency and avoidance of nuisance.

Another paper read at Sheffield (and one which possessed special importance, on account of the subject introduced into the discussion) was that by Vernon Harcourt, on "The Pentane Standard, and a New Form of Photometer." The question of an alteration in the standard was fully dwelt upon in the discussion, and led to the following resolution being proposed by the President, and unanimously carried—"That the question of standards of light be referred to the Council, with power to act as seems best in their judgment." In pursuance of this resolution, the Council met on July 25, 1883, and appointed a committee to investigate the question. The committee engaged as experts, Messrs. Heisch and Hartley to perform the necessary experiments, which, by the kindness and courtesy of the Gas Light and Coke Company, have been carried out in their testing-room at Horseferry Road, Westminster. The continuation of the experiments at Barnet, on the effect of condensation on the illuminating power of gas, has also engaged the attention of the council during the year.

In his address last year, the President dwelt at considerable length upon the then recently closed International Electric and Gas Exhibition at the Crystal Palace; and concluded his remarks by saying that three scientific experts had been appointed to thoroughly examine the various exhibits. These gentlemen were engaged for a considerable time in making their experiments, with the result that a mass of very useful information was obtained, which will be published, in the form of a report, by the committee

who took charge of the development of the gas section of the exhibition. I had not the honor of serving upon that committee; but, in my capacity as one of the jurors of the exhibits, I have had an opportunity of examining the reports, and am well able to say that they contain much valuable information that may be studied with great profit by the members of the Institute. The tables dealing with stoves are very elaborate; and by their aid comparisons of the most exhaustive character may be made between those of different make and capacity.

Of the matters that will be brought under your notice at this meeting, I would specially draw your attention to the proposed alteration in the rules. These have been most carefully considered by the council, and have been framed with the view of improving the status of the Institute; and this, if passed, I feel sure they will do, both professionally and financially.

There does not appear to be any work of importance for the Institute in the immediate future; but its constitution is now such that it may be taken to represent the gas interest at large—not, as formerly, restricting itself to matters interesting only to gas managers. In this capacity it will be prepared to use its influence on all matters that may from time to time arise. This influence will naturally grow and increase, as opportunities are presented for the usefulness of the Institute being developed. As you will have learnt from the report of the council, it is suggested that the Institute shall be made a center from which certificates of competency should be issued, as results of examination by the council; forming a species of diploma, which could be utilized by the recipient in advancing his position in life. Doubtless this would be a good work, and one of the opportunities for the Institute to improve its own status and that of the gentlemen to whom it might be able to give its certificates. This is one of many possible spheres of usefulness, whereby the Institute may be enabled to advance gas engineering science.

During the past year there have not been any notable changes in the system or principles of gas manufacture. It may be gathered, however, from the statements of those companies whose accounts are published in detail, that steady progress is being made in the quantity and quality of the gas produced from each ton of coals carbonized; the cost of production being reduced to a corresponding extent. As I have previously noticed, attention has been largely directed to the question of firing retorts with gaseous fuel in regenerative furnaces. This may be taken as a feature of the year; but as yet its adoption is only in its infancy. In fact (at any rate in England), it can scarcely be said to have passed the experimental stage; although I am informed it is largely adopted on the Continent, and with very beneficial results.

Mechanical stoking has also engaged the attention of several engineers. At Beckton, West's Improvement Company have erected two of their compressed air machines; but the results of their working have not as yet been sufficiently developed to determine whether their adoption will be extended. At Nine Elms (the works of the late London Gas Light Company), two of the Ross stoking-machines were at work during the past winter with considerable success, as far as economizing labor is concerned; but it has been found, as the result of experience, that certain alterations of the machines are necessary, in order to make them thoroughly effective. Machines of each of these types have, I am informed, been brought into use at Birmingham, with results similar to those obtained in London. Now that attention is much more directed to this branch of engineering, and the increasing demands for gas in all our centers of industry render necessary the construction of larger and more convenient retort houses, the time is probably not far distant when the greater portion of the exhaustive labor of the retort house will be done by machinery. Apart from the question of economy, it will, from a humanitarian point of view, be a step in the right direction; for it is undoubtedly wrong to expose the human body to the great heat to which stokers are subjected, if senseless iron and steel can be made to do the work, guided by the power of the human intellect.

On the question of purification there is no new feature to record, with the exception of the attempted introduction of Cooper's process of mixing lime with the coal, before its introduction into the retorts, for the purpose of increasing the yield of ammonia, and also of recovering some of the sulphur compounds. Opinions seem to be considerably divided upon the value of the process. It has been tried at several places on a fairly large scale; but so far as I am aware, has not as yet been introduced into practical working anywhere, with the exception of the Tunbridge Wells Gas Works, from whence it is to be hoped that more information will be forthcoming as greater experience is gained. Any process which will increase the bye-products of gas manfacture (which have now become of much greater importance than they formerly were) should be received with favor, and thoroughly investigated; as upon our bye-products so much of our success depends, and will, I believe, continue to do so—and to an increased extent—in the future. The thorough purification of gas in permanently closed vessels is an operation greatly to be desired, and is one that has attracted the attention of the first gas engineers and chemists for a long period. Twenty-five years ago I was engaged, with the late Mr. R. Laming, in experiments having this object in view. The obstacles which at that time proved insurmountable were the proper purification of the ammoniacal liquor (which was the medium employed) and the difficulty of keeping in contact the two moving streams of foul gas and purified liquor. The latter difficulty has been largely met by the improved washer-scrubbers of various types introduced of late years; but a purifying medium perfect in its action, and at the same time economical as to cost, has yet to be introduced. I commend to the younger members the consideration of this subject, as being a very promising one on which to employ their energies and inventive talents.

Steady progress continues to be made in the utilization of gas for purposes other than those of illumination. New gas engines are being introduced. Gas cooking and heating stoves continue to be improved in manufacture; and, with the knowledge of their great convenience and usefulness extending, as the result of the exhibitions that are continually being held in various parts of the country—and notably that at the Crystal Palace last year—they are every day becoming more utilized. The direction in which most progress has been made in this department is probably that of the introduction of gas for bread-baking, in ovens specially designed for the purpose—a paper on which subject will be read at the present meeting by Mr. Booer, of Leeds. The system is very complete. The cost of the gas has, however, hitherto impeded its progress; but it is now found that the saving of waste, as well as the additional conveniences of manufacture, coupled with cleanliness and absence of smoke from the combustion of the fuel, more than compensate for the extra cost. Other makers are, I understand, also in the field, devoting their attention to bread and confectionery baking by means of gas. These should be encouraged by us; as every new use to which gas is applied means an increased consumption of our staple article.

I will now say a few words on the commercial state of our industry. This continues to flourish; and, notwithstanding reductions in price, with extending business, dividends are maintained at their maximum by the great bulk of those companies where they are limited, and are increasing in the case of those who are working under the sliding scale in proportion as the price is reduced to the consumer. Reductions in price have been very general throughout the past year in all parts of the country. We, in London, are unable to emulate our more fortunately situated friends who, from proximity to the coal fields, obtain their raw material at a much lower price than we do; but, nevertheless, the prices in London are now from 2s. 8d. to 3s. per 1,000 cubic feet—prices which a few years ago were thought to be unattainable. The prosperity has not been confined to gas companies. Those local authorities in whose hands is the supply of gas have likewise, in many instances, reduced the price, as well as handed over large sums toward the reduction of the general rating. The price of our raw material—coal—has remained fairly uniform; and the supply has not been affected by any untoward circumstances, if we except the strike amongst the miners in the South Yorkshire district, which was threatened in November and December last, but which fortunately did not take place. Some few users of the production of that district had to take the precaution of making supplemental contracts at higher prices; but these transactions were not numerous.

The price of coke, notwithstanding the exceptional mildness of the winter, has been very well maintained; but the continually increasing tonnage of coal carbonized, coupled with the saving effected in the use of coke by the introduction of improved furnaces, indicates the necessity for some special effort being made to increase the range of its utilization. The various organizations which are in existence for effecting the abatement of smoke in our large towns all show that the domestic fire is the great source of the production of smoke, and the consequent pollution of the atmosphere. It would appear, therefore, that the use in our houses of a smokeless fuel—such as coke—is a great desideratum, and would form such an outlet for our surplus make as I have indicated above as being necessary. But, in order to properly consume coke in an ordinary grate, it must undergo a species of manufacture—that is to say, it must be broken up into comparatively small pieces. This is an expensive operation, and, besides, is attended with considerable waste, owing to the increased quantity of breeze made. I believe, however, that the present price of coke, as compared with coal, could well bear this cost. If, then, by this operation, and by some persistent canvassing, it could be introduced, and the prejudices of the British householder be overcome, a new and permanent opening would be made for its use, which would be beneficial all round. By the abatement of the smoke, our atmosphere would be improved; by the purchase of a cheaper fuel, economy would result to the consumer; and lastly (although not least in importance as far as the gas industry is concerned), an additional and profitable market would be found for our principal bye-product, the advantages of which as a fuel are at the present time very imperfectly understood. In my own house I have for some years used a combination of about one-third broken coke and two-thirds coal, with very good results as to heat, pleasant fires, and reduction of smoke. The principal difficulty I have experienced has been that

of properly mixing the coal and coke, consequent upon limited cellar accommodation.

Some correspondence lately took place in the columns of the *Journal of Gas Lighting* on the subject of the comparative advantages of selling coke by measure or weight; but as we shall have read to us at this meeting a paper bearing upon this subject, by Mr. F. C. Humphrys, I will not anticipate the discussion by expressing any opinion on the question at the present stage of our proceedings.

The value of tar and its multitudinous products is now lower than it was at this time last year; and, from all I have been able to ascertain, the prospects in the immediate future are not very encouraging, although probably we, as gas managers, need not be under any apprehension as to a large decline in prices. The price of sulphate of ammonia has throughout the year been low, gradually falling through the summer and autumn months, until the lowest point was reached about the middle of November, since which period there have been several fluctuations, which, on the whole, have tended upward. The present prospects of the trade are somewhat more encouraging than they have been. Existing stocks are exceptionally low, and the demand appears to be increasing; but, on the other hand, the quantity produced is a continually increasing one, from the fact that many small gas works now dispose of their liquor for its manufacture, where formerly it was allowed to run to waste, was evaporated in the ashpans, or otherwise unprofitably disposed of. Besides this, the ammonia produced in coke ovens is arrested and utilized; and there are also manufactories established where coal is distilled for the sake of its products other than gas. These sources of supply (in the aggregate) produce large quantities, which sensibly affect the market; so that it is improbable that the large price which ruled a year or two ago will again be reached, unless some great and unexpected change takes place in the demand, or in the supply of nitrate of soda, which is the great competitor with sulphate of ammonia in the chemical market. With an article upon the price of which supply and demand have so important an effect, and with which also other productions come into competition, there must always be a considerable amount of fluctuation and uncertainty in the market value. Some idea of the importance of the price of sulphate of ammonia, and its effect on the cost price of gas, may be formed from a consideration of the fact that £1 per ton of sulphate represents, in round figures, ½d. per 1,000 cubic feet of gas made.

Since we last met the several district associations have held their usual meetings, which appear to have been very successful, and have been the means of disseminating much useful information. As assistants to this our larger Institute, they occupy a very important position, as at their meetings members are induced to bring forward and discuss papers in a much less formal manner than at these meetings; the effect being that they gain a knowledge of their own powers, and a habit of concentrating their thoughts and giving them expression, which enable them afterward to enter with greater confidence the larger arena. In this way the district associations are of great use to our Institute—forming, as it were, training schools; and if they have not already done it, they will ultimately introduce men with great powers for good, who might possibly otherwise have never come to the front. It has often occurred to me that the district associations could materially assist the Institute, were they to take a subject and deal with it at their meetings—concentrating their minds upon it, and possibly making concurrent experiments; and then bring forward the result of their united effort in the form of papers to be read at our meetings. In making this suggestion I am well aware that I am, as it were, reviving an old idea, as such a one has frequently been expressed before; notably by Mr. Corbet Woodall, in his presidential address in 1878. But I am so strongly impressed with the idea that considerable good might be effected by some such united action that I venture to again make the suggestion to the various district associations, hoping that they may be able to see their way to do something in this direction.

The most important work in connection with patents during the year is the commencement of the operation of the new act on Jan. 1, 1884. Its effect was to induce a very large number of inventors to hasten to the Patent Office and seek protection for their inventions. In 1883 there were 5,993 applications for patents. In the first two months of this year there were no less than 4,172 applications; or at the rate of about 25,000 per annum. This proportion has not been maintained; but up to May 26 there were 8,246 applications, or at the rate of about 20,000 per annum. The greatly reduced cost at which protection may be obtained is doubtless the cause of the largely increased number of applications, as many who could never hope (under ordinary circumstances) to be able to afford the payment of the old rate of fees, now find their way to the Patent Office and secure protection for the outcome of their inventive genius. The new act has been introduced avowedly in consideration of the poor inventor; but whether it will ultimately prove beneficial to him remains to be ascertained. Certain it is that capitalists and large manufacturers have much greater facilities for worrying the inventor in his attempt to obtain a patent than under the old law; but to what extent this will, in practice, be found to be a serious defect it is impossible to say. The system of examination adopted, although preferable to that followed in America, is a very questionable one. But while doubtful as to the advantages the new act has been expected to produce, it would be unfair to pass a definite opinion upon the merits or demerits of a measure which has been in force only five months, when at least 18 months or two years experience is necessary before anything like a reliable judgment could be formed of its working. It must, however, be admitted by all that, whatever may be the general results of the passing of this act, the authors deserve some credit for the introduction of many important provisions which constitute improvements upon the old system.

During the last session of Parliament there were no acts passed of any importance from a general point of view—no new principle having been introduced into those that were passed, the clauses having been generally drawn upon lines established by precedent; and during the current session it does not appear that any bill is under the consideration of the Legislature that possesses other than a local interest.

This address would probably not be considered complete were I not to make some allusion to the electric light. I have purposely left its consideration till the last, feeling that it has now assumed a position of very minor importance as far as the gas industry is concerned. It has been proved, and—judging by the results as shown in the defunct and moribund companies—proved over and over again, that it cannot compete with gas, as now very generally used, at the prices that rule in England. Notwithstanding the failures which have taken place, we, as gas engineers, must not ignore the fact that there is a source of artificial illumination other than the one in which we are more directly interested, which may come into competition with us, and which doubtless will find its position alongside of gas in certain places where its peculiar qualities render it more suitable. It has always struck me that the electric light, in the incandescent form, is particularly well adapted for use for lighting our large ocean-going steamers. The conducting wires might be laid with great facility all over the ship; the lights would be fixed and shielded, so that the danger from fire would be reduced to a minimum; and, further, ample steam power would always be at hand, to be employed for driving the dynamo machines when required. I am informed that several large ships are now so lighted, and with marked success.

I have now brought under your notice such matters as I considered would be most interesting and worthy of your consideration, having in view the advancement of the profession generally, and of this Institute in particular. In doing this I trust I have not wearied you; and I have now only to thank you for the kind attention with which you have listened to my remarks.

A New Era.

By Antiquus.

The progress of the so-called triumphal march of water gas has long been watched with careful interest by those who have to solve or in any manner aid in the solution of the present problem of cheap and efficient illumination. The most ardent advocate of the coal gas process can hardly deny or afford to overlook the fact that there has been some show of progress made in this direction. Indeed, in many towns and cities the new process has supplanted the old; and it is an important question to those having an interest in the old process to know exactly the cause and the portent of that supersedure.

Since great engines move slowly, we find that by far the greater number of changes took place among the smaller companies, since these form the majority of those that have already gone over; the same rule being likely to hold good hereafter, it will be well to consider what were the reasons for such transformation.

It is stating a truism to say that the condition of a gas works is an all important and determining factor in questions of change. If that is so, we wonder not why the new process has progressed so far, but may be forgiven for asking why it has not made a cleaner and wider sweep. Many of the functions of the apparatus of a gas plant are very similar to those performed by the organs of the human body; and we may liken the presence and progress of this new gas to an epidemic from which those shall best escape who are in proper physical health.

Now, we find that many of the small works about us are monuments to a past generation; and, in that they have stood and worked so long and so well, they are monuments to the thoroughness and ability of the builders of that generation. They have been built hard on to thirty years, and in that time they have neither been repaired nor enlarged beyond the call of the barest and most urgent necessity. Parts of the plants are the identical apparatus erected when first the works went into operation, and those parts, too, which must bear the greatest portion of the burden of the increase natural, in the lapse of years, to such a business. Everything is small, cramped, and inadequate. The epithet "old-fashioned," so often applied to the process in vogue in them, is a just expression of the state of such works. They

cannot possibly produce gas as good and as cheap as it should be produced; but no fair-minded man will say that they are a fair exemplar of the coal gas process of the day, nor that they should be held in comparison with new plants or processes of whatever kind or nature.

If, under those circumstances, the managers or owners of such works receive propositions to change their plant to fit the conditions of a new process that is not only represented to, but probably actually does, make gas cheaper and of better quality than they have been making it, can we wonder that they "harken to the voice of the charmers?" They have long seen that some change was imperatively needed, but have delayed instituting it from year to year, and now have the usual desire, characteristic of those who are suddenly aroused from long inaction, to rush to fierce extremes, and mount at one stride to the seventh heaven of prosperity.

Naturally enough, such men turn to their own books and compare the present cost of their gas with the proposed cost of the new gas; and they conclude, correctly enough from their premises, that the new gas is far the cheaper. So, unjustly and illogically, do they compare the cost of coal gas, as produced in their own confessedly old-fashioned and worn-out works, with the cost of new gas in a new plant of proper dimensions, thoroughly equipped with the latest appliances for the economical production of a high candle power illuminant. We can by no means assure ourselves that they then go to the trouble of inquiring at what cost coal gas is being produced in other works equipped with proper apparatus, nor attempt to ascertain the relative cost of putting their old works in a condition comparable with the proposed new water gas plant, nor determine the cost at which they could produce coal gas with their works in such improved condition. Many considerations lead them to lend a ready ear rather to those who promise that in the future the manufacture of gas shall be as easy as the descent to Avernus—there is no ulterior allusion intended here—for, during the winter, the superintendents of such works are often at their wit's end to supply the demand for gas, and find that the problem of pouring a quart from a pint jug causes them immeasurable worry. But lo! oil is poured upon the troubled waters of their minds, for here is a process that, in the twinkling of an eye, evolves gas in any desired quantity from the very elements themselves. They have sat patiently waiting for customers to remove that mountain of coke at their retort house doors, and here is a process that will furnish no troublesome residual. And so we might go on through the whole familiar story.

A grave and improper feature of the gas business is that, with the exception of the engineer and superintendent, officers and directors of gas companies are never within the works from one year's end to another. They are so deeply engrossed in other material occupations that their attention to the gas business is infrequent, hurried, and perfunctory. It is said by them that they are not practical gas men, and could not give advice of any value even were they desirous of so doing. This is nonsense; a few hours spent in the manufacturing department would enable them to acquire information leading to the exercise of more intelligent and accurate judgment when it came to the discussion of the propriety of making a change; and, further, it would seem rational to believe that the general criticism and suggestions of a body of intelligent business men, such as generally compose the boards of direction of gas companies, are most valuable to any manufacturing establishment, however intricate and peculiar its processes may be.

Now I scarcely believe that similar conditions exist in any other industry; and they could not exist in the gas business were it not of such a peculiar and isolated nature.

All that has been said may seem an overdrawn picture; but it is entirely true in some, and partially true in many other cases of change or proposed change, and especially so where we hear complaints about an antiquated and inefficient process. A sifting of these complaints, in nine cases out of ten, discloses the fact that the faults are by no means incident to the process complained of, but are attributable to the fault-finders themselves. The greatest confirmation of the fact that the coal gas men had been dozing is seen in the long line of reductions in price of gas published in nearly every issue of the JOURNAL. We know that coal is cheaper this year; but the reductions in price are greater and more general than would be accounted for by the decline in coal prices. And yet again, coal has been reduced as to selling prices in former times without occasioning such widespread and sweeping reductions in gas rates as now witnessed. Take, for example, a recent voluntary reduction made by a certain company, of nearly 30 per cent. in the price of gas, where the reduction in the price of coal was only about 8 per cent. That shows how far this particular company was from realizing the possibilities of its business. And with all these things so, what a harvest was waiting for the scythe of a new and cheap illuminant!

Looking over the whole wide field of the gas business, we see that it was, at the time of the introduction of these old-new processes, as events have proved, in most vulnerable condition. When the glare of the electric light burst upon the heavy eyes of these Rip Van Winkles of the gas industry they awoke to find themselves armed with but rusty and old-fashioned weapons wherewith to oppose a young, vigorous, and well-equipped enemy. I think no one will deny that the claimed progress of the water gas process would have been by no means so noisily bruited about if, upon its first appearance, the works with coal gas plants had been up to a proper and easily attainable standard of efficiency. For have not those who had their works in such condition remained, nearly without exception, in the coal gas ranks? Still, the effect of all this agitation has been salutary to a great degree. Undoubtedly coal gas manufacturers, having been brought into a position where they must do their best or have it go hard with them, are now working with unwonted zeal. The plants throughout the country are being put, year by year, in better condition, and the price of gas is going steadily down, with the consequence that a much more solid and decidedly less inviting front is presented to competition and opposition; and the result is what we would naturally expect.

Coal gas is showing what it can do in a way that is surprising alike its friends and its enemies. Desertions from the ranks are growing more and more infrequent; and some, sadder and wiser through eating the fruit of experience, are returning. We seem to be entering upon a new era of energy and alacrity, bringing prosperity to the producer and satisfaction to the consumer—a combination certain to form a strong and sure defence against the attacks of those who have raised their standard against us.

Something More about Gas from Sawdust.

By J. E. BICKNELL.

Permit me to state a few facts, which it would seem justice to myself demands, in reply to Mr. Walker's article in the JOURNAL of July 2. He first states that I produce a gas of feeble illuminating power, afterward enriching with an admixture of oil gas.

This statement is to a certain extent true, depending upon the standard taken in comparing "feeble illuminating power." I am led to believe by his article of May 2d, in which it is stated that "when thoroughly dry sawdust is used, and the apparatus is properly constructed, so that air can be entirely excluded, and, at the same time, proper temperatures maintained, a gas is obtained having an illuminating power of from 12 to 15 candles," that we do not differ very materially as regards the relative illuminating power of the gas produced under each process. We produce a gas of 12 candle power from sawdust alone, which we do *not* consider "possesses in itself sufficient illuminating power for all practical purposes," especially in these days of electrical appliances and the cry for more light; consequently we enrich the wood gas, as before stated.

Mr. Walker evidently claims a point by stating that he obtains numerous residual products. Now these various products, in order to be of any commercial value, must be manufactured and worked over, requiring the addition of a plant nearly, if not quite, as extensive as the gas plant.

In this matter of residuals I have pursued a different course—the object sought being to manufacture gas at the expense of the residuals, not to manufacture residual products to the detriment of the gas. Holding to this theory, we have succeeded in converting all of the volatile matter contained in the wood into a fixed gas, leaving only the charcoal as a bye-product. Thus I claim to have gained another decided advantage.

Mr. Walker states that it will be found impracticable to use any "extended surface of iron, which is sure to warp and crack when exposed to heat." If Mr. Walker will take the trouble to visit Cleveland, Ohio, I will be happy to show him from eight to ten cast iron carbonizing pans, identical with those used by me, which have been subjected to an almost constant heat, ranging from 1,200° to 1,800° F., for a period of three years, and are, to all appearances, good for as many more years. It is evident that the pans tried at Deseronto were either of very poor iron or were not properly set; or, what is more probable, they were improperly fired. It is not so much the degree of heat carried which will crack cast iron as sudden changes of temperature. In fact, the liability of cast iron to crack is greater before the kindling wood has burned than after a strong heat has been obtained. A draught of cold air will sometimes act in a detrimental manner upon any form of cast iron. A fire-clay pan can be used with good effect; but, as yet, we prefer cast iron—our temperature not going higher than 1,000° F.

For a moment, admitting Mr. Walker's explanation in reference to the depth of sawdust upon his retort bottom, let us compare the capacity of the two machines as stated in the previous numbers of the JOURNAL.

Mr. Walker's machine will produce 20,000 cubic feet of gas per 24 hours, while my apparatus produces 117,459 cubic feet of similar gas in the same time, or a working result nearly six times greater than that obtained by the above-named gentleman. The expense of running would seem to be about equal in each case.

With all due respect for Mr. Walker and his process, I merely desire to call attention to these facts, mention of which he seems to have overlooked.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

Danger in the Incandescent Light.—A Boston, Mass., correspondent sends us the following particulars in relation to damage caused by fires started through defects in the Weston system of incandescent electric lighting, which system has obtained some sort of a footing in Boston. "On the night of June 30 (fortunately the hour was early) and alarm of fire from fire-box 41 was the means of bringing to light a somewhat interesting condition of affairs. Just previous to the alarm the clerks in the New England Trust Company, whose premises are in the Lawrence Building, at the corner of Devonshire and Water streets, were startled by the irregular flashing of the incandescent lamps, with which the offices are illuminated, and a few minutes later one of the wooden fixtures, to which wires were attached at the rear of the building, was found to be on fire. Almost simultaneously with this discovery a large pendant, with three lamps attached, hanging over the table in the clerk's dining room (the dining-room being in the front part of the building) fell from the ceiling to the floor. The room was filled with smoke, but the firemen, who promptly responded to the call, did not find it necessary to turn on a stream of water, cutting away the electric supply wires soon putting an end to all danger. The loss occasioned did not exceed over $100 in value, and the greater portion of this has to be shouldered by the Weston Company on account of damage to pendant, lamps, wires, etc. Before the firemen had left the Lawrence Building a citizen rushed into the place, and said the office of John C. Paige, an insurance agent doing business at No. 20 Kilby street, was on fire. It was only the work of a few seconds to reach danger spot number 2; and here it was found that the incandescent lighting system was also at fault. The wires were speedily severed. A like condition of affairs was next reported as existing in the Maverick National Bank, at the corner of Congress and Water streets, and a similar method of averting the spread of conflagration was pursued as in the other two instances. The Weston people profess to be unable to account for the affair, but it is said by some parties that the local regulator in the Lawrence Building was out of order, and would not 'take up' an excess of current when such excess happened to be developed."

The childish innocence of electric light purveyors, invariably displayed in cases of this kind, when they are interrogated as to causes of such occurrences is little short of wonderful. We are told time and time over that the supply of the electric current can be made perfectly safe—in fact that such supply is now absolutely perfect. Switches, cut-offs, regulators, and so on, automatic in their action and sure in their effect, are installed at certain points in the system; and, yet, what do we find? Nothing more nor less than the constant happening of accident similar to those noted above. Returning to the subject discussed by our correspondent, it will be readily understood that had these slight fires been started in the same locality only an hour or two later serious results might have followed. We understand that the premises of Mr. Paige have been set on fire two or three times before the case given above; and the Weston folks assured that gentleman each time the remedial measures instituted would surely prevent future trouble. Mr. Paige has had good chance to display his patience; and patience having ceased to be a virtue with him, at least in this particular direction, the gentleman has now ordered the electric lighting company to remove its "traps" from his office. Indeed so frequently have fires been started from defects in the Weston system at Boston, that the attention of the Fire Underwriters has been attracted to the matter; and this body has recently announced that "all risks will be cancelled on premises where the light is permitted to remain."

Petroleum Oil in Michigan.—The discovery of petroleum oil in Roscommon County, Michigan, continues to be a topic of great interest to the people of that locality The well first discovered is yielding enough oil to make the pumping of it profitable, 115 barrels having been taken from it in 24 hours. Numerous capitalists have made overtures to the lucky prospectors; but the owners do not seem disposed to sell, and have refused an offer of $30,000 for their "earth whale." The oil market is much depressed from these repeated "finds," and prices for crude are ruling very low.

Not Caused from Naphtha.—In our issue of June 16, we stated that the fire at the works of the New York Mutual Gas Light Company (works located at the foot of East Eleventh street, New York City) was attributed to the ignition of naphtha. We also substantially repeated the same in issue of July 2. Mr. John P. Kennedy, president of the company, writes us, under date of July 7, that we were in error in so reporting. Mr. Kennedy says the "exact truth about the matter is that the fire originated in the store-room, in a bale of new cleaning waste, at a point as remote from any naphtha as the extent of our premises would admit." Glad to know it, Mr. Kennedy; and cheerfully give space to the desired correction. Still the news that this particular fire was not occasioned by ignition of naphtha detracts nothing from the truth of the fact that naphtha might very properly be designated by the term "liquid gunpowder."

Will Freeport (Ills.) have the Electric Light?—Mr. Z. T. F. Runner, Superintendent of the Freeport (Ills.) Gas Light and Coke Company, informs us that the Van Depoele Electric Light Company has purchased the plant and appurtenances belonging to the concern that first started in to relieve Freeport's inhabitants from their dark and benighted condition. This plant has remained in a state of continued idleness and masterly inactivity since January 1 last; and it seems to us that the Van Depoele people would make more money by letting it remain idle for, say, about ten years longer, than in attempting to operate it just now. Freeport folks are pretty well-satisfied with their gas company.

A Meter Contract.—Messrs. Dickey, Tansley & Co., of Baltimore, Md., have just been awarded a contract whereby they are authorized to construct for the St. Louis, Mo., Gas Light Company, a station meter, the drum of which is to be 12 feet by 12 feet. This does not quite look as though Brother Lansden had decided to shut his works up for the present. Perhaps he even might be troubled to get a "vacation spell" during the summer.

Ill Health of Mr. Chas. D. Lamson.—Mr. Chas. D. Lamson, the widely known and much respected superintendent of the Boston Gas Light Company, has, we are sorry to say, been of late in a state of health far from that which his friends would wish him to enjoy. The management of the company have finally insisted upon providing for the lightening of his labors, and accordingly have appointed Mr. Wm. A. Wood, son of Austin C. Wood, of Syracuse, N. Y., to the position of assistant superintendent. This was a graceful act on the part of the Boston Company, for Mr. Lamson will now be relieved of many tasks that are sure to be ably performed by the new appointee. It is well known to the fraternity of the United States how unremitting and assiduous Mr. Lamson has been in the discharge of his obligations to the Boston Company, and we hope soon to announce that his restoration to complete health and strength has been accomplished.

Price of Gas Reduced at Paris, Ill.—Mr. Z. E. Powell, Secretary and Treasurer of the Paris (Ill.) Gas Light and Coke Company, has been authorized to issue the following circular to the inhabitants of that place:

"Paris, Ill., June 24, 1884.

"In order to induce a larger consumption of gas, it has been decided to allow a discount on all monthly bills (of 500 cubic feet or over) if paid at the office of the Company within eight days from the first of each month. The new schedule will be as follows:

Bills for less than 500 cubic feet.....					$3.00 per thousand.
"	500 cu. ft.	and less than	1,000 cu. ft.	..	2.70 "
"	1,000 "	"	2,000 "	..	2.60 "
"	2,000 "	"	5,000 "	..	2.50 "
"	5,000 "	"	10,000 "	..	2.40 "
"	10,000 "	"	15,000 "	..	2 35 "

"Gas meters do not register a consumption of less than 100 cubic feet, hence whenever the meter does not show a use of at least 100 feet during the month, a rental of 25 cents will be charged, except in case of parties being absent from town. When the meter is read at the first of the month a statement will be furnished, giving amount of gas used for the preceding month; and, in order to obtain the discount, bills must be paid, without further notice, at the office of the company, not later than five o'clock P.M., by the eighth day of each month, except whenever the eighth day falls on Sunday, then on the following Monday; otherwise all gas burned will be charged for at the regular rate of $3 per thousand.

"This schedule will go into effect on September 1, 1884, and apply to the consumption for that month. It has been the constant desire of the company to supply consumers with a good quality of gas at such a price as to justify but a fair return on the capital invested.

"The first consumers were charged at the rate of $4 per thousand; this price we have gradually reduced until we now offer a reduction of nearly one-half this amount. As the price of gas depends largely on the amount of consumption, by making this reduction we hope to obtain the patronage of every one. The larger our number of consumers the cheaper we can supply gas, as, in any event, we are obliged to keep a regular set of hands employed in the manufacture.

"We feel confident that with prudent use, and judicious arrangement of burners, etc., a much more agreeable light can be had at less cost than by any other means, considering the items of convenience, cleanliness, and safety. If our consumers will assist in the increase of sales, and the advocacy of gas, we trust we will speedily be enabled to offer further reductions in the future. Z. E. Powell, Secretary."

That is the sort of strain to sing to your consumers. Paris is a comparatively small place, as yet; but it evidently has a promising future before it. Certain it is that the Paris Gas Company does not wish to retard that future, as the action just taken is evident guarantee. It also should be borne in mind that gas at $2.60 per thousand on a consumption of 1,000 feet monthly

is a fairly low figure, when all the circumstances are taken into consideration. Now, let the consumers of the town do their part; and if they respond (as almost undoubtedly they will) in proper manner, we have no hesitation in saying that Secretary Powell will speedily carry out the promise made in the last paragraph of his concise and easily understandable circular.

THEY WILL HAVE A HARD TIME OF IT IN TRYING TO PLUNDER THE OLD NEWARK (N. J.) GAS COMPANIES.—From advices received from the fair and flourishing city of Newark, N. J., it appears that certain disinterested and extremely liberal gentlemen wish to get permission from the local authorities to start an opposition gas works there. These would-be purveyors, in our humble judgment, had better "steer their bark" to some more likely place, for if there is one locality better protected than another to resist the attacks of such strikers, it is this very city of Newark. However, here is what we have heard. On the evening of July 1, Messrs. Shickhaus, Sargeant, Inman, Matthews and Brown, five representatives of a corporation recently organized under the laws of the State of New York, and known as the Consumers Gas Works Company (by-the-way, what consumers do they represent?) appeared before the Committee on Lamps and Gas to give the reasons why that committee should present a favorable report to the Common Council on the propositions submitted by them, which propositions meant the erection of another gas works in the city of Newark. Ex-City Counsel Young was on hand to represent the interests of the existing companies. When the meeting was called to order, Mr. Shickhaus (who, it may be said, was formerly an Alderman of the city) said that he felt constrained to ask for an adjournment, as he noticed the old companies were represented by counsel, and the petitioners were not prepared to meet off-hand the legal questions that might be brought up; he, therefore, asked that the consideration of the matter be delayed. Alderman Connelly asked under what laws the company had been organized, and Mr. Shickhaus replied that the corporation was organized under the laws of the State of New York. Alderman Connelly then inquired whether the applicants knew the present position of the city in regard to the gas question—a proposition had been made by the existing companies that if the Common Council would secure the old companies from competition, they would voluntarily abrogate their present contracts, and substitute therefor new ones, to run five years, and that if this was agreed to the city would save something like $100,000 in that period. Mr. Shickhaus said that were the new company given power to proceed, the city would save a much larger sum than that named, owing to the ensuing competition. Alderman Murphy wanted to know how much the new concern wanted to charge for gas, and received, in reply, $1.75 per thousand as the proposed figure. Alderman Murphy thought there should be a very clear and specific statement made of what the new company proposed to do, as he considered it was a very serious matter to tear up the streets in order that pipe might be laid. He was of the opinion that the petitioners would have to show that the action proposed would be of great benefit to the people before he should favor it. He would like the gentlemen to show, at the next meeting of the committee, a case where competition had benefited the gas consumers of any city. At this juncture Counsel Young said it was futile for the committee to take action, as by the laws of the State of New Jersey the public streets cannot be used for the purpose indicated without the consent of the Legislature. When this company came before the committee organized under the laws of New Jersey it would then be time to consider the proposition. Mr. Inman said the company was not fully organized, but could be within 24 hours; and Alderman Murphy said he would be pleased to listen to the gentlemen when the company was organized and ready to do business. Alderman Connelly asked if the company would be willing to organize under the laws of New Jersey; and Mr. Inman said, no; they did not propose to work under a law enacted in the interest of the old gas companies. Counsel Young claimed the petitioners had no rights before the committee until organization under the laws of the State had been effected; Alderman Connelly moved that the whole matter be referred to the City Counsel for his opinion. After the question had been further discussed, the motion to refer was carried. We think the above report goes to show that these five disinterested gentlemen had an idea that this business could be rushed through the committee before the old companies had gotten "wind of it." The presence of lawyer Young appears to have disconcerted them somewhat; and, to say the least about Messrs. Shickhaus, *et al*, they figure rather prominently as first-class specimens of what is now generally considered an extinct race—the *genus* carpet-bagger. Their satchels will need repairing before they get funds enough to buy new ones out of the profits reaped from a division of the business of the present existing gas light companies of Newark.

PRICE OF GAS IN PHILADELPHIA, PA.—On July 1 last, the resolution passed by the Gas Trust officials some time ago, whereby the price of gas was to be reduced from $1.90 to $1.70 per thousand, went into operation. It is now stated as probable that during next winter the price will be further reduced to $1.50 per thousand. Ten years ago the city of Philadelphia paid the Gas Trust the sum of $50 per street lamp-post per annum, and this involved an annual expenditure amounting to hundreds of thousands of dollars. Since then the charge for street light service has been gradually reduced until the beginning of the present year when the free system was instituted. This move was strongly opposed by us at the time as unfair to those who used gas and paid for it. If the idea of making no charge for street lights had not been followed out gas could now be sold, for domestic consumption, at the rate of $1.50 per thousand. During the past winter the Gas Trust plant was worked to its fullest capacity—indeed, the plant was overtaxed—the highest per diem send-out reaching 12,000,000 cubic feet. Great extensions have been made to the Delaware river stations, and the improvements are being paid for out of the current receipts.

CHEAP GAS FOR BRIDGEPORT, CONN.—The Bridgeport (Conn.) Gas Light Company, from and after 1st of June last, decided to reduce the price of gas to $2, $1.90, and $1.80 per thousand cubic feet. These are net figures. Can anyone tell us what has become of Mr. Allen and his inclination to repeat the Poughkeepsie proceedings at Bridgeport? Perhaps he has reflected on the situation.

HAD TO GET LARGER QUARTERS.—The Siemens Regenerative Gas Lamp Company, of Philadelphia, Pa., has so prospered under the business-like management of Mr. Stein that the genial gentleman was obliged to find more roomy quarters. The new address of the Company is "Northeast corner of Twenty-first street and Washington avenue, Philadelphia, Pa." The success that has attended the introduction of this burner into the United States is simply wonderful. The factories are working night and day in order to keep pace with the demand, and this news goes far to show how the American gas maker is disposed to activity and alertness. There is not a single company in the States but would find it profitable to call the attention of local boards to the efficacy of the large power lanterns for lighting prominent squares, and the gas men should not rest satisfied with simply speaking about such things. Go ahead and order two or three specimens, and set them up in your town; they will speedily show their own value even to the most prejudiced. We do not call your attention to this because we want to "puff" the Siemens Lamp Company. Our pages are not open to that line of action. And neither will the Siemens Company need such "puffing," as the merits of their goods are self-evident. We do call your attention to the subject, though, just for the purpose of enabling you to place yourself in a position where you can laugh at the doings of the electric lighting speculators, and maintain the key to the position of suppliers of light for public and private uses. The fraternity of England and France have long been active in their efforts to show just how brilliant a street light can be afforded by the agency of gas; and if confirmation of this be needed, just turn to page 268 of the last volume of the JOURNAL (issue of June 2, 1884), in the article entitled "Some Account of the Operations of the Paris (France) Gas Company During the Year 1883," where it is seen that out of a total of 57,405 public street lamps of all classes, there are maintained, at the expense of the civic authorities, 1,007 high power lamps. Of this number 706 consume 50 cubic feet per hour, and 301 consume 31 feet per hour. In addition to these, so well has the advertisement paid, private individuals have been induced to install a total of 2,059 similar lights. Remember, too, that the price of gas in Paris is higher than the price charged in certain cities of this country; remembering this, just make the simple calculation of what gas consumption is represented by this grand total of 3,066 high power lights, and you will find it to be equal to about the annual consumption of 26,700 ordinary street lamp burners supplied at the rate of 5 cubic feet per hour. Recall to your memory that Paris was really the birthplace of the arc light, and finish your task of recollection by keeping in view the no less severe truth that Paris is also its grave. What is done in Paris can be readily done here; then set out with a will to raise a monument to its American memory, and that monument can be erected in a very short space of time by simply going about it in the right way.

BUSY MANUFACTURERS.—The gas works builders all over the country report a wonderfully busy season as being experienced. Here is some account of what the Stacey Manufacturing Company, of Cincinnati, Ohio, is doing. This company is now at work on gasholders, of the following dimensions, the cities in which they are to be set up also being given.

Cedar Rapids, Iowa, single section...	76′ × 22′	8 wrought iron columns.
Piqua, Ohio, single section.....	53′ × 16′	5 wrought iron columns.
Rockford, Ill., single section.....	40′ × 16′	in building.
Athens, Ohio, single section.....	42½′ × 16′	5 cast iron columns.
Danville, Ill., single section.....	40′ × 14′	5 cast iron columns.
Minneapolis, Minn., telescopic.....	58½′ × 30′ 60′ × 30′	in building.
Memphis, Tenn., telescopic.....	96½′ × 24′ 98′ × 24′	10 columns.
Consumers Co., Ontario, telescopic..	98½′ × 22½′ 100′ × 22½′	10 columns.

HERE IS ANOTHER SAMPLE.—If the above be not sufficiently convincing that our manufacturers are "being hurried" by the gas makers, just look at this list taken from the books of Messrs. Bartlett, Hayward & Co., of Baltimore, Md.:

A telescopic holder, 111½ feet in diameter, with two 30 feet lifts, for the Cleveland (Ohio) Gas Light and Coke Company. This holder will be housed in. An eight wrought iron column suspenion frame telescopic holder, 91½ feet in diameter, with two 26 feet lifts, for the Columbus (Ohio) Gas Light Company. A ten column wrought iron suspension frame telescopic holder, 100 feet in diameter, with two 26 feet lifts, for the Milwaukee (Wis.) Gas Light Company. A twelve column wrought iron suspension frame telescopic holder, 121 feet in diameter, with two 30 feet lifts, for the Washington (D. C.) Gas Light Company. A telescopic holder, 33½ feet in diameter, with two 14 feet lifts, for the Norwalk (Conn.) Gas Light Company– this is to be enclosed. The following work will be completed during the last of the month, all done to the order of the Equitable Gas Light Company of New York city.

Four telescopic holders, 91½ feet in diameter, with two 26½ feet lifts, and eight column wrought iron suspension frames; one telescopic holder, 51½ feet in diameter, with two 14½ lifts, and six column suspension frame. Besides these items Messrs. Bartlett, Hayward & Company, report the receipt of a multiplicity of orders for such work as the construction of purifiers, condensers, scrubbers, etc.

A PRACTICAL ENDORSEMENT.—Messrs. Fairbanks, Morse & Company, of Chicago, Illinois, have recently entered into a contract with the Westinghouse Machine Company, of Pittsburgh, Pa., whereby the first-named firm is to have exclusive control of the sale of the Westinghouse Automatic Engine in the Western States and Territories, the articles of agreement to that effect having been signed on July 1, from which date the contract also becomes operative. Looked at in the light that this agreement was only reached after a thorough and complete investigation of the merits of these engines, as compared with others of a kindred character, the action taken by Messrs. Fairbanks, Morse & Company would seem to be important, inasmuch as it carries with it positive evidence of practical endorsement.

CUTTING DOWN SELLING PRICES AT NEW BEDFORD, MASS.—At a meeting of the directors of the New Bedford (Mass.) Gas Light Company, held on Tuesday, July 8, a dividend of 5 per cent. on the capital stock was declared. But there was another move taken whereby the gas consumers of the town were also granted a substantial return; and the move consisted in the passage of a resolution to reduce the price of gas, on and after September 1, to certain classes of consumers. The prevailing price is $2.50 per 1,000 cubic feet, with 20 per cent. discount off, or a net rate of $2. Commencing with September 1, all consumers of 12,500 cubic feet quarterly, are to be charged at the rate of $1.87½ per thousand; a consumption of over 25,000 cubic feet per quarter will be charged for at the figure of $1.75 per thousand. The New Bedford *Daily Mercury*, in mentioning the action, says: "It is very satisfactory that the public are invited to share with the stockholders in the prosperity of the gas company." It must be pleasing to Mr. Taber to know that the press of his locality appreciate the action taken; and, Messrs. gas men, it is an excellent thing to have the newspapers of your localities in accord with you.

RECOMMENDING A TRIAL OF THE "MAST" SYSTEM AT SAN FRANCISCO, CAL.—At a meeting of the Street Committee of the San Francisco, Cal., Board of Supervisors, the question of trying the experiment of lighting certain portions of the streets of the city by means of the "mast" arc light system was considered. The California Electric Light Company proposed to erect five of these mast, each to be 150 feet in height, and each to have attached thereto four lights of the invariable 2,000 candle power quality. The price proposed to be charged was $5.12 for each mast per night. When the subject had been discussed the committee decided to recommend to the Board that the experiment be tried. If the Board is wise it will have nothing whatever to do with the mast electric lighting business—since it may fairly be claimed that of all the failures prominent in connection with the employment of electricity in street lighting operations none have been more pronounced than those illustrated by this very mast system. Will some of our San Francisco readers kindly "post" us in reference to the final action taken?

Taking Down a Chimney.

Messrs. R. M. and F. J. Bancroft, in a paper jointly prepared by them, give the following details of the method pursued in taking down a chimney shaft at Middlesborough, England. The plan followed was rendered imperative, as, owing to the position of the chimney, being closely hemmed in by various structures, it could not be thrown down.

The bricks had to be lowered with as little damage as possible, so that they might be used again for building purposes. Owing to the position of the chimney, the bricks could not be thrown down outside, and if thrown down inside they would have been smashed, or if lowered by mechanical means the process would have been very tedious and was impracticable. Under these circumstances it was considered whether the bricks could not be allowed to fall by by their own gravity, and at the same time be cushioned sufficiently to treak their fall and prevent damage. In order to do this an air-tight iron box was placed at the bottom of the chimney; this box was fitted with an air-tight door mounted on hinges and closing on an india-rubber face, against which it was tightened by a wedge. A wooden spout was then fixed to the top of the box and carried up the chimney; it was 3½ inches by 5 inches inside and was made of planks 1½ inches thick, well nailed together, with a little white lead on the edges, thus making it air-tight. The spout was made in about 12 foot lengths, and these were joined together by cast-iron sockets or shoes and corked round with tarred yarn, the whole apparatus costing about $30. A few stays were put inside the chimney to keep the spout steady, and steps were nailed upon it, by which the men ascended. It will be seen that, the whole of the spout being air-tight, if a brick filled the spout it would not descend; but as the section of a brick is 3 by 4½ inches, and the spout was 3½ by 5 inches, there was a quarter inch space each way through which the air could pass the brick freely, the space further allowing for any irregularity in the sizes of the bricks. The result was that the bricks, being cushioned in their fall, arrived at the bottom without any damage. As soon as the box was full the man at the bottom rapped on the spout as a signal to stop, and then opened the air-tight door and removed the bricks inside. This being done, he shut the door and signaled to the man at the top. The man on the top lowered his own scaffold, and as the spout became too high he cut a piece off with a saw. If there was much mortar adhering to the bricks it was knocked off before putting the latter into the spout, and such mortar, etc., was allowed to fall inside the chimney and was afterward wheeled out.

Cooling a Room.

The composing room of the New Orleans *Picayune* is situated in the upper story of its publication house, just under the roof, and in summer it is extremely hot. An inspiration seemed to have come to one of the occupants, and in accordance with it a vertical wooden box was constructed in the corner of the room, with openings at the floor and ceiling, and furnished with a pipe for supplying water at the top, and a pan and drain at the bottom for receiving the flow and carrying it safely away. The supply pipe was bent over the upper end of the shaft, and fitted with a rose like that of a watering pot, so as to deliver a shower of spray instead of a solid stream. On connecting it with the service pipe the movement of the water was found to cause an active circulation of the air in that part of the room, which was drawn in at the upper opening of the room and issued again, cool and fresh, at the floor level. The most surprising thing about the experiment seems to have been the effect of the water in cooling the room to a degree much below its own temperature. Of course the absorption of heat by the evaporation of a portion of the water accounts for its refrigerating effect; but the result seems to have been so easily and inexpensively attained that the experiment would be well worth repeating in other cases.—*Sci. Press.*

Correspondence

[The JOURNAL is not responsible for the opinions expressed by correspondents.]

They "Watched" Him.

SYRACUSE, N. Y., July 9, 1884.

To the Editor AMERICAN GAS LIGHT JOURNAL:

Mr. W. A. Wood severed his connection with the Syracuse Gas Light Company on the first of June last in order to accept a responsible position in the Boston (Mass.) Gas Light Company's works. Mr. Wood's departure from Syracuse was quite sudden and entirely unexpected by the employees who have worked under his guidance during the past seven years. They "watched" for Mr. Wood's return from Boston when he would come on for the purpose of removing his family to his new field of labor; and so, on Saturday, July 5, upon his arrival at Syracuse with that end in view, they summoned him into the office, where all hands had assembled in force, and, through spokesman Mr. H. N. Babcock, Treasurer of the Syracuse Company, Mr. Wood was presented with an elegant and valuable gold watch and chain. The presentation was accompanied with many expressions of regret at his departure, and a multitude of good wishes and hopes for his future prosperity. Mr. Wood was completely taken aback (he not having had the slightest intimation of what was to be done) at this entirely unexpected expression of good-feeling towards him, but recovered his equilibrium soon enough to respond in suitable and fitting terms. An hour or more was then taken up in disposing of the refreshments provided, after which followed a hearty handshaking with the fifty employees present, and thus ended a pleasant evening. Mr. Wood returned to Boston on Tuesday, July 8.

ONE OF THE "WATCHERS."

THE AMERICAN
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WEDNESDAY, JULY 16, 1884.

Taxing Dividends on Gas Stocks.

The Legislature of the State of New Jersey recently passed an act whereby the Commonwealth, through its representatives, is empowered and authorized to impose and collect a tax of one-half of one per cent. on all annual dividends declared on the stock of gas light companies, as well as other manufacturing corporations, when such dividends are over and above a four per cent. per annum rate. It was urged that this measure was unconstitutional, and the different companies agreed to make common cause of the matter, in order that the question of legality could be settled. In accordance with this understanding the subject was referred to a conference of lawyers composed of the following gentlemen: Messrs. Bedle, John W. Taylor, John R. Emory, Senator Schenck, John L. Blake, and Senator Applegate. Early this month the conference rendered a unanimous opinion to the effect that the subject had received thorough investigation, both as to constitutionality and in its application to the gas light companies of the State, and the result of such examination was to convince the referees that the tax was valid in every particular. It is expected that no further legal steps will be taken to contest payment of the tax. The gentlemen in charge of the gas interests of the State of New Jersey have set an example, in the course outlined above, worthy of imitation by their brethren throughout the country. No one company sought to determine the validity of the impost, but all joined hands in the common cause; and while we are sorry the legal talent selected could not reach a different conclusion to the one arrived at, it is pleasing to witness at least one situation where the gas men are in thorough accord as to the necessity of concerted action in opposing measures likely to prove of injury to all concerned.

The Market for Gas Securities.

An even-tempered, strong pulsation has ruled through the past fortnight in regard to the market for New York city gas shares; and while no great advance has been noted save in the case of Metropolitan gas, which records an upward movement of four points in the bid price, the prevailing tone is really one of surprising steadiness and strength. This is a pleasing state of affairs, and particularly so in the face of the approach of the Equitable Company's works to an advanced stage of completion. In regard to Equitable shares (which, of course, have had no consideration as a factor in our estimate of the state of the market), this security has recently developed a tendency to marked symptoms of weakness, as the quotation of 85 to 88 shows. We are informed that the decline was occasioned through a purely manipulative movement, and are unable to give any positive news as to the truth or falsity of the statement. At any rate, it is certain that the stock is not nearly so firmly held as it was three months ago.

Brooklyn shares are strong. We will, however, venture the prediction that there is more money to be made at present on the "short" than on the "long" side of Brooklyn gas stocks. Jersey City Gas Co. declared and paid its semi-annual dividend of 7½ per cent. on July 1. San Francisco (Cal.) gas did not maintain the improvement mentioned in our last issue.

Gas Stocks.

Quotations by Geo. W. Close, Broker and Dealer in Gas Stocks (with W. B. SCOTT & CO.,)
34 PINE STREET, NEW YORK CITY.

JULY 16.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share.

	Capital.	Par.	Bid	Asked
Central	$466,000	50	60	70
Equitable	2,000,000	100	85	88
Harlem	1,800,000	50	120	123
" Bonds	170,000		—	—
Manhattan	4,000,000	50	284	288
Metropolitan	2,500,000	100	234	237
" Bonds	658,000	—	107	110
Mutual	3,500,000	100	127	130
" Bonds	1,500,000	1000	104	106
Municipal	3,000,000	100	200	204
" Bonds	750,000		107	110
New York	4,000,000	100	152	154
Northern	125,000	50	—	80
" Scrip	108,000			
Gas Co's of Brooklyn.				
Brooklyn	2,000,000	25	127	130
Citizens	1,200,000	20	89	92
" S. F. Bonds	320,000	1000	106	110
Fulton Municipal	3,000,000	100	135	140
" Bonds	300,000		104	108
Peoples	1,000,000	10	75	80
" Bonds	290,000	—	105	110
" "	250,000	—	90	95
Metropolitan	1,000,000	100	90	92
Nassau	1,000,000	25	102	107
" Ctfs	700,000	1000	85	90
Williamsburgh	1,000,000	50	115	125
" Bonds	1,000,000	—	104	108
Richmond Co., S. I.	300,000	50	—	75
" Bonds	40,000	—	—	—
Out of Town Gas Companies.				
Buffalo Mutual, N. Y.	750,000	100	80	85
" Bonds	200,000	1000	95	100
Citizens, Newark	918,000	50	100	104
" " Bonds.	124,000	—	105	10
Chicago Gas Co., Ills			150	155
Cincinnati G. & C. Co.			187	190
Consolidated, Balt.			50	51
" Bonds			113½	114
Central, S. F., Cal.			51	55
Capital, Sacramento, Cal.			56	58
Hartford, Conn.	750,000	25	122	123
Jersey City	750,000	20	150	155
Laclede, St. Louis, Mo.	1,600,000	100	98	—
Louisville, Ky.	1,500,000	50	124	130
Montreal, Canada	2,000,000	100	186	187
New Haven, Conn.		25	166	170
Oakland, Cal.			28	29
Peoples, Jersey City		—	75	80
" " Bonds.			—	—
Paterson, N. J.		25	96	99
Rochester, N. Y.		50	70	80
Washington, D. C.	2,000,000	20	190	200
Wilmington, Del.		50	174	—
Yonkers		50	—	40
St. Louis, Missouri	600,000	50	255	256
San Francisco Gas Co. San Francisco, Cal.			50	50½

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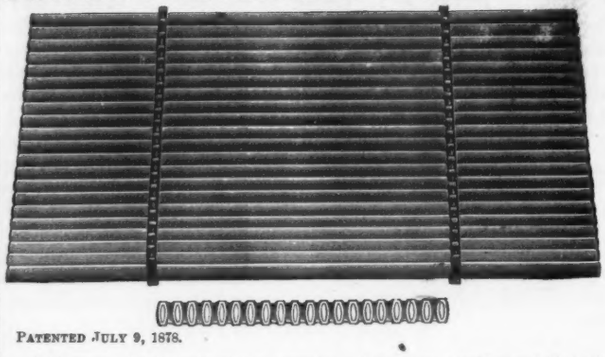

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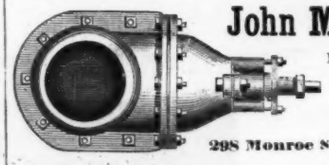

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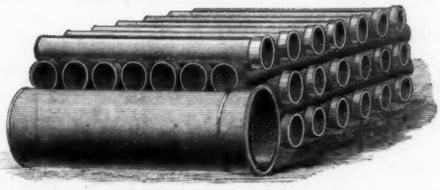

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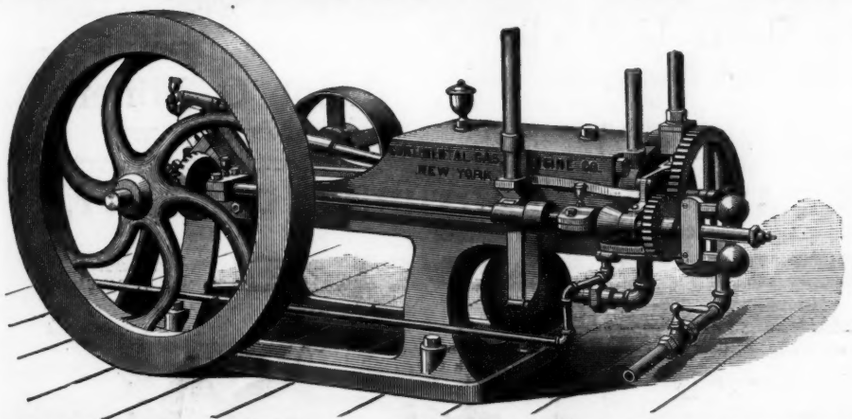

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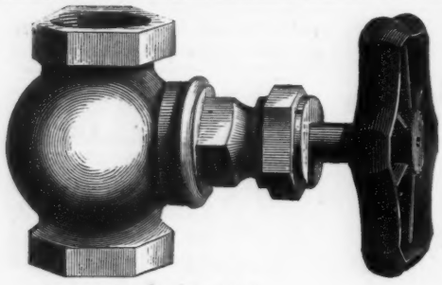

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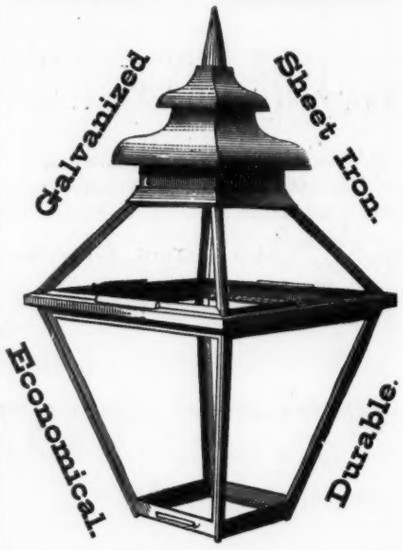

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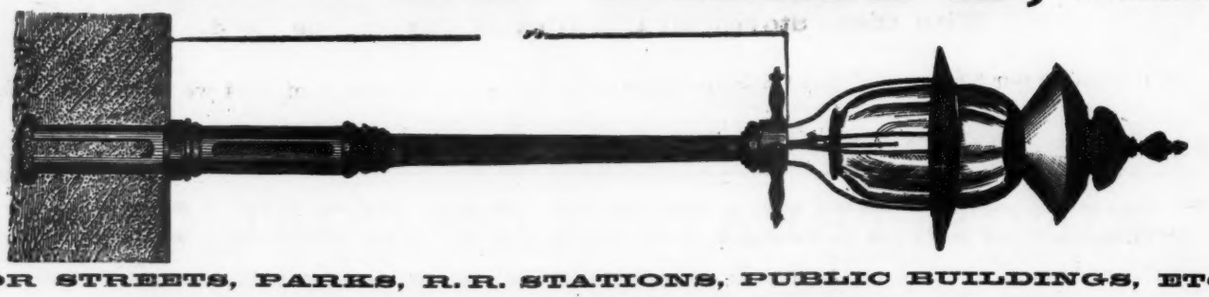

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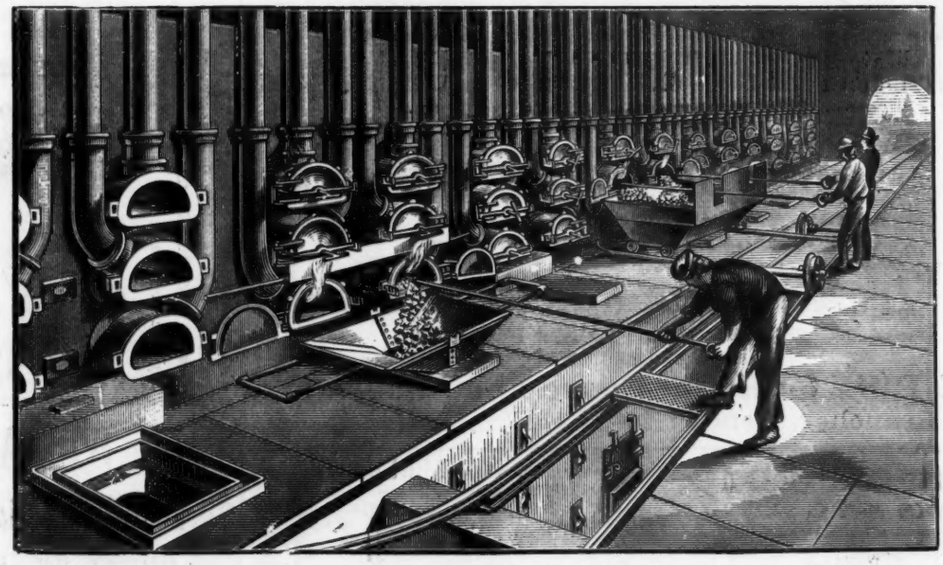

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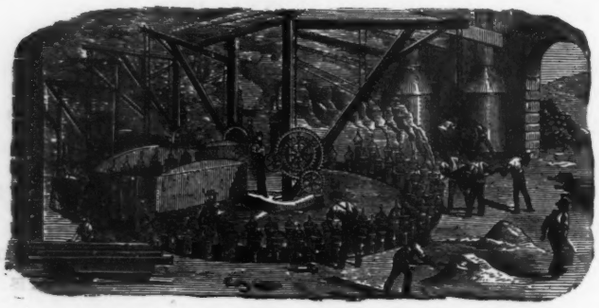

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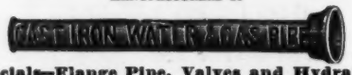

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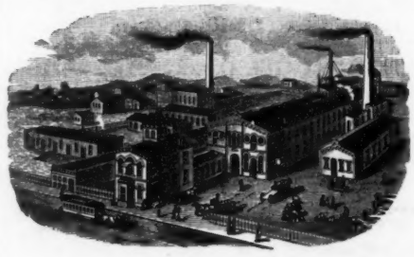

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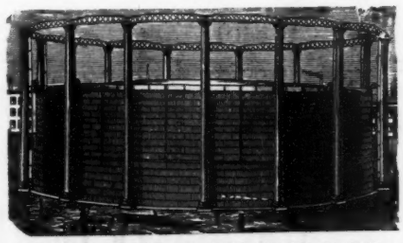

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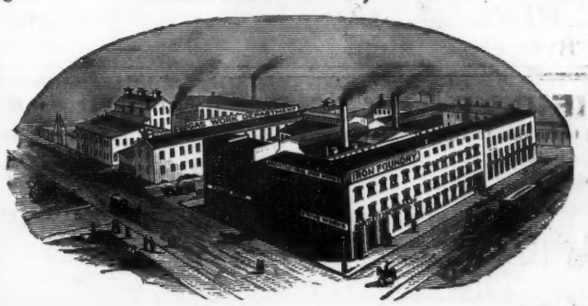

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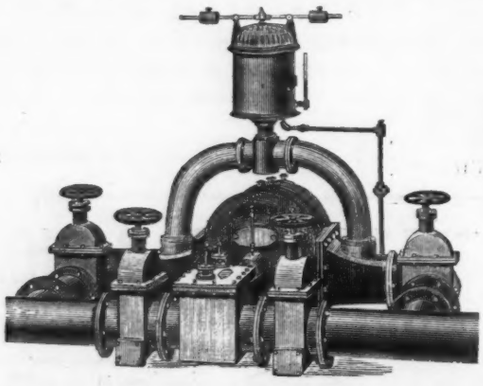

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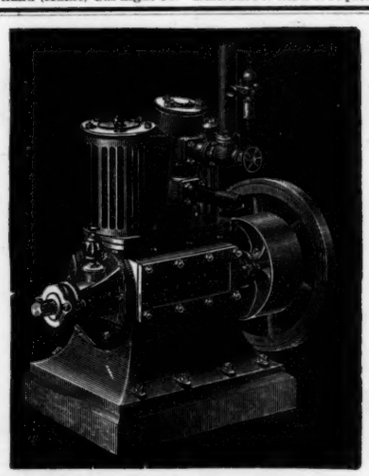

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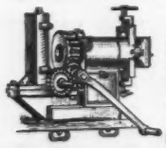

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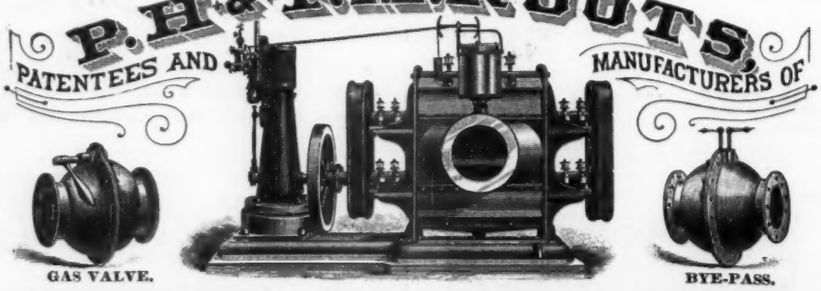

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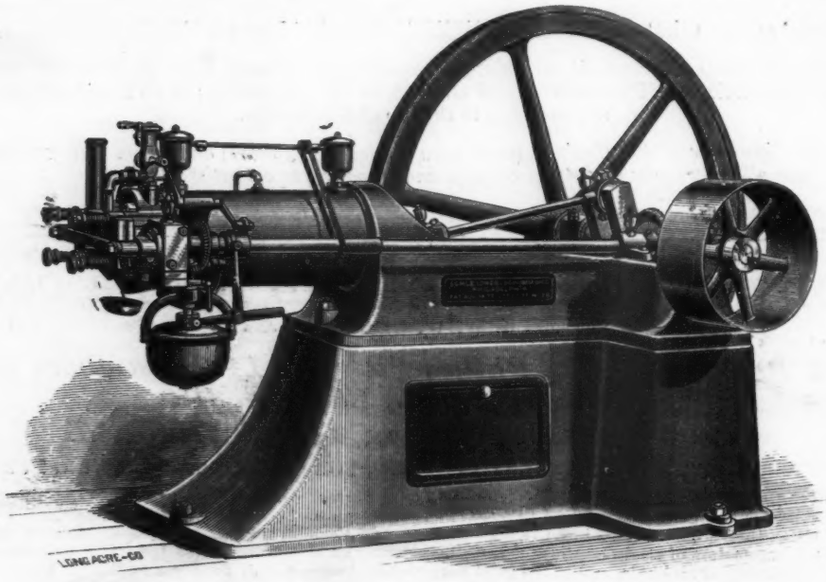

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